The
Electrical Review

VOL. CXIII. SEPTEMBER 22, 1933 No. 2913.

THE OLDEST ELECTRICAL PAPER. ESTABLISHED 1872.

Published every FRIDAY, Price 6d.

THE ELECTRICAL REVIEW, DORSET HOUSE, STAMFORD STREET, LONDON, S.E.1.

Telegraphic Address: "AGEEKAY, WATLOO, LONDON." Code, A B C. Telephone No.: Hop 3333 (50 lines).

The "Electrical Review" is the recognised medium of the Electrical Trades and has by far the largest Circulation of any Electrical Industrial Paper in Great Britain.

SUBSCRIPTION RATES, Postage Free: United Kingdom, £1 14s. 8d. Canada, £1 12s. 6d. Colonial and Foreign, £2 1s. 6d. per annum. Cheques and Postal Orders (on Chief Office, London) to be made payable to ELECTRICAL REVIEW, LTD., and crossed "Lloyds Bank."

For List of Foreign Agents for the ELECTRICAL REVIEW see Advertisement Supplement.

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Grid Service

THE industrialist under present conditions is not disinclined, as he was sometimes in the past, to risk disturbing his works routine to obtain lower power costs on the ground that these are only a small proportion of his total production costs. Evidence continually reaches us from all over the country that our manufacturers are very ready to consider reasonable proposals to take power from the public mains; this often involves the electrification of processes formerly carried out by non-electrical methods, provided the power specialist knows how to make out a good case.

The recent decision of Messrs. J. & P. Coats, Ltd., to take the whole of their electrical requirements at their three largest mills from Paisley Corporation is important on several grounds, one of which is that it provides an indication of the more ways than one in which the grid can serve the industry.

The consumption at these mills totals about 28½ million kWh per annum, and as sales by the Corporation previously amounted to only a little over 13 million kWh per annum, some time must have elapsed, under independent generation, before the plant needed to deal with a 225 per cent. increase could have been installed, even if the costs had been low enough to compete with those of the existing mill plant. From the grid, conveniently at hand, the Corporation is able to meet the whole of the new load almost immediately, and at a price that has made it practicable for the undertaking to cope with a load much larger than that provided by all its other consumers.

Mr. J. E. Adam, the burgh electrical engineer, was also able to call upon the experience gained by engineers of the Central Electricity Board in similar negotiations elsewhere. This was a wise move as, apart from the somewhat special features involved in the work of securing consumers of this magnitude, the ability to introduce convincing precedents comes only from practice in the weighing of many factors in similar circumstances. Moreover, the Board was able to agree that the plant at the largest mill should be retained for peak-load operation if required, which probably favourably influenced the discussions.

The connection of the mills will call for the manufacture and installation of additional h.v. transformers, switchgear and cables, but there can be cause only for congratulation if the capital cost of the national scheme goes on increasing due to productive expenditure of this kind

While it is certainly an excellent thing that a large consumer should be gained by an undertaking, that load should be provided for the grid, and that work should accrue to electrical manufacturers, there is more in it than this. The grid exists for the benefit of industry as a whole. In this case an important industrialist has benefited, and it is the effect on the consumer that is the ultimate criterion.

If the national scheme is to achieve the maximum of success the Board cannot, any more than any other authorised undertaker, limit its activities to the production of electricity.

Progress Without a Showroom

EXCELLENT progress is recorded in the accounts of the Islington Electricity Department. A policy of low tariffs and generous expenditure upon new mains along frontages where the supply was not previously available has helped to bring on an additional 3,000 consumers (making the total 24,468), the rate of advance being the same as for several preceding years. For ordinary supply the increase in units sold was 1¼ millions; this is less by a million than in 1931, but the general depression, together with the fact that three consumers taking over a million units left the district, are factors in the situation. Owing to the lower tariffs the net surplus fell by £636 to £45,942, but interest charges were £6,000 higher. The results must be gratifying to Mr.

A. P. MacAlister and his staff, whose efforts have been unaided by either showroom, sales department, or hire or hire-purchase facilities. These means of popularising supply are proving so highly successful in other places that one wonders why Islington Borough Council deems it impolitic to introduce them. An undertaking which can do so well without them must have both a desirable area and a good commercial spirit, but, in the absence of complete saturation, which, of course, nobody nowadays can claim to have reached, it might reasonably expect to do far better with a complete specialised commercial organisation.

A New Counsellor

In a letter appearing in our "Correspondence" pages to-day Sir Harry Brittain reviews the present position of electricity supply, embodying many of the arguments with which our readers are familiar regarding the need for the general pursuance of an enterprising and up-to-date commercial policy. He quotes the view of Colonel Crompton that the real job before us now is one for the commercial traveller rather than the engineer; he also supports the much-discussed project for an Electrical Sales Development Association. In the multitude of counsellors there is wisdom, but is it not high time to get on with the job? In many ways our undertakings can be more commercially aggressive without waiting until new associations are set up.

"Their Inevitable March."

The newspaper Press credits Mr. Frank Hodges with stating in a public speech on Monday last that "electricity and gas would continue their inevitable march." These last three words sound very impressive, but precisely what do they mean when uttered by a member of the Central Electricity Board? We ourselves frequently use the expression "accelerate the pace of electrical development," and it is the duty of the Press and of the Board to sweep aside thoughts that prevent the rapid loading up of the grid. We are in for a race; surely we want to run—not to march along "inevitably" shoulder to shoulder with those whom we are out to defeat.

Bread Upon the Waters

A realisation that initial expenditure by consumers is a serious deterrent to the wider use of electricity is shown by many supply undertakings in their readiness to embark upon hire, hire-purchase and assisted-wiring schemes. These mainly relate to the domestic field, but they should be extended in appropriate forms to other types of consumers. We have suggested from time to time in these columns some of the many ways in which the relatively prosperous electrical undertakings can help the hard-pressed power consumer. Similarly every help should be given the farmer in the way of extended credit, particularly in the financing of service lines that may supply only individual consumers. The tide is set in the direction of electrification, and we must take it at the flood, as popular enthusiasm easily ebbs unless continually stimulated. It may be a case of casting our bread upon the waters, but if we have the courage to do so, there is little doubt as to the return in the future.

Ferranti Progress

Mr. V. Z. de Ferranti was able to report very satisfactory results of the operations of Ferranti, Ltd., during a year of progressive change, at the meeting held last Friday. During the period the transformers for the Central Electricity Board, including the two 75,000-kVA units at Liverpool—the largest connected with the grid—were completed, but arrangements were well in hand for the production and supply of apparatus and appliances required by the consumer of electricity. In the domestic field large developments have been made in connection with superheterodyne receivers, the new heptode valve, radiant electric fires, of which thirty-two models are available (with sales double those at this time last year), immersion water heaters and alarm clocks. Manufacturing facilities have been extended at the capital cost of £34,244, chiefly in the domestic apparatus department. The aggregate turnover of the Ferranti business was practically maintained, and the profit was increased from £54,905 to £57,869. Things would have turned out better still but for trading conditions in Canada.

The Radio Consumer

One point brought out in Mr. Ferranti's speech is particularly worthy of attention. We refer to his remark that radio was the electricity supply industry's best salesman. There is substantial foundation for the statement, for radio apparatus is in various places bringing an increasing number of consumers on to the mains. There is good reason for believing that it will continue to do so. We must co-operate with this tendency to encourage the introduction of the mains into at present non-electrical houses, for if their necessity is felt in order to provide radio service a long step forward is taken toward the installation of all kinds of electrical fittings and appliances.

Space Heating

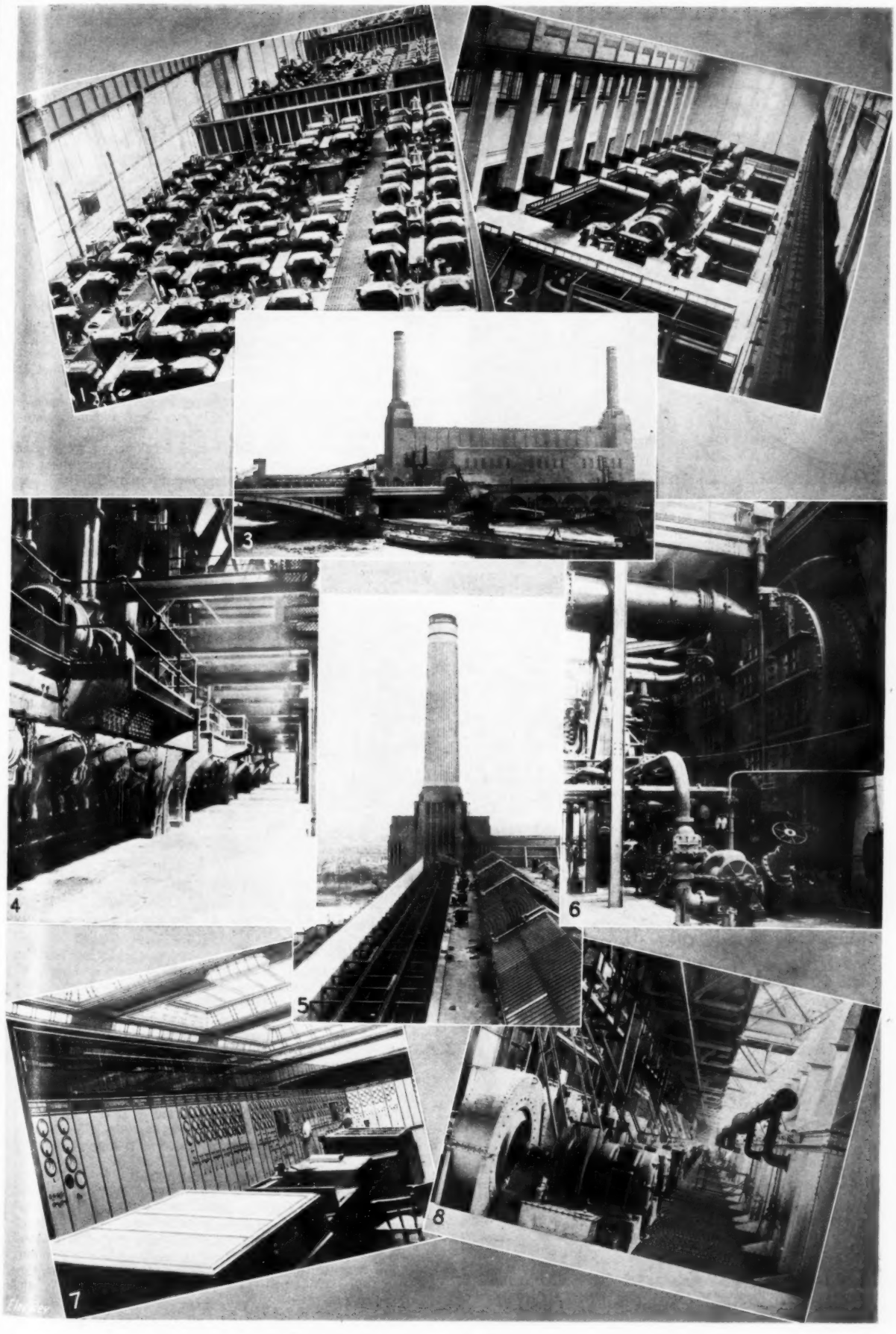
E.D.A. is to be commended on its latest report—that on the warming of buildings by electricity. This will provide salesmen—and chief engineers—with a fund of information and talking points couched in plain language, so that they will not be tempted to hand on technicalities to the layman. What gives this publication its chief value is that the data given is based upon first-hand experience, and includes actual records of the use of electricity in different types of buildings. Nothing convinces the potential consumer more than receiving proof that someone in his own position, without an axe to grind, is glad to have changed over to electricity. Hence the practice of astute sales engineers of persuading a satisfied consumer to show prospective users his installation and to talk about it.

Overseas Trade in August

Although exports of electrical goods and apparatus during August show an advance of £105,369 over the figures for the corresponding month of 1932, this improvement is more than offset by a decline from £270,516 to £156,288 in electrical machinery exports. A drop of £24,542 in imports was due principally to decreases of £16,975 and £16,738, respectively, in the purchases of telegraph and telephone apparatus and unenumerated electrical machinery. Compared with July the value of exports was £15,637 lower, again on account of decreased shipments of electrical machinery; this decline would have been more severe but for increased activity in the telegraph and telephone section. Except in the case of incandescent lamps, imports generally exceeded the August, 1932, values, and were £64,903 higher at £255,294.

Elma's "Secluded Emotion"

Some of our correspondents are interested just now in that bane of electrical organisation progress—"initialitis." While certain people are "asking for more," some protest that the tendency has been overdone, and our sympathy, if we have any, lies with the latter. See, for the sake of illustration, in what confusion the electrical industry has been plunged. We read in a dramatic criticism in a leading daily paper on this Wednesday morning of going to press: "Yet the history of Elma's struggle for spiritual regeneration is tragic. Her defilement in the house of a bestial lover would be complete if"—but, stay, that is quite sufficient for the Electrical Review! "Elma" is not our E.L.M.A., but a part played by Miss Jean Forbes-Robertson in "As You Desire Me" at the Gate Theatre, in which she gave "perfect expression to the intense secluded emotion of Elma."



The Battersea Station of the London Power Co. **(See page 386)**

1. Top of the main switchgear. 2. A view of the turbine room. 3. The exterior of the station. 4. The boiler-house firing floor. 5. The sludge-drying trough of the flue-gas washing plant. 6. The condenser pit. 7. Part of the control room. 8. The induced draught plant

Rural Electrification Developments. By "Cincinnatus"

Only one per cent. of the farms are connected

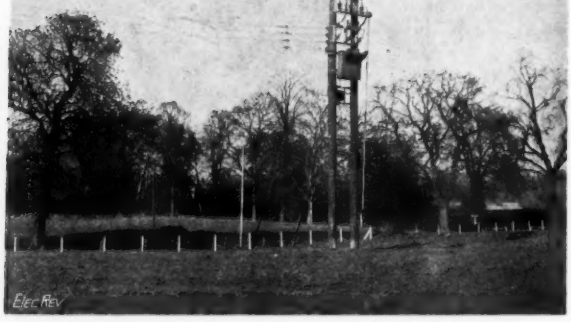
THE electrification of rural areas in Great Britain is one of those movements which forms part of a radical change in method. While proceeding steadily it does not attract great publicity, and in consequence revolutionary changes in rural life can take place without the urban dweller being aware of them. While there are not more than 5,000

Chenies village on the "Metesco" system in which every house is connected

farms electrified in the country to-day out of some 420,000 recorded as "agricultural holdings," at the beginning of 1930 the number of electrified farms was only 2,500, and a few years before that was below 1,000. The saturation of electrified farms varies enormously throughout the country, depending upon the activity of the local supply authority in developing the rural load. The Yorkshire Electric Power Company has over 500 farms in its area, the Chester Corporation about 300, and the Bedford Corporation 180. The national proportion of slightly below 1 per cent. compares unfavourably with 11 per cent. in the U.S.A.

The completion of the grid on September 5th, when the last tower was erected at Fordingbridge, marks the entry into the second phase of electrical development, the utilisation of the national power scheme, and there is little doubt that the electrification of rural communities by supply authorities will take place far more rapidly in this ensuing period than ever before. When such unpromising rural areas as those of Dumfries in South Scotland and of the Ringmer Supply Co. in South-East Sussex are being developed through the advent of the grid lines, it is evident that even the most "difficult" areas can be tackled successfully by enterprising minds who do not make immediate returns the sole criterion of success.

In to-day's depressed agricultural conditions the rural worker's surplus for light, heat, and power is small, so that the price to the consumer must be the lowest economic figure.



A rural pole transformer in the Derby and Notts area

This price will depend largely upon the capital required to provide an adequate service in the area, upon the extent of consumption of electricity, and upon the rapidity with which the grid tariffs come into force throughout the country. A simplification of tariffs will help development considerably; such incentives as assisted-wiring schemes, hire and hire-purchase of apparatus, and attractive two-part tariffs with a unit charge of not more than 1½d.—and, if possible, 1d.—form essential parts of commercial development on modern lines.

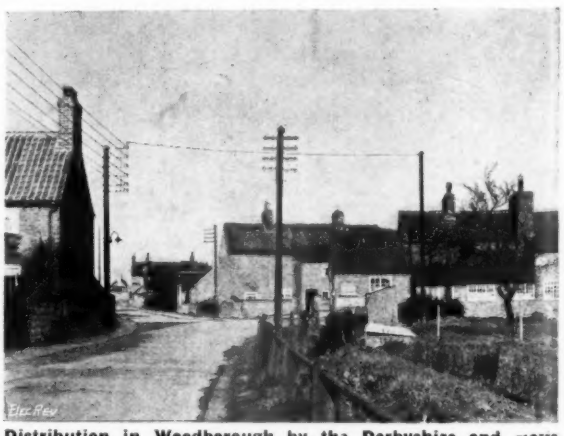
In this connection, experience shows that the high initial expense of planned development schemes, including regular demonstrations, sales propaganda, and efficient maintenance and advisory service, can be undertaken most economically in large areas. For this reason the proposed co-ordination of small areas of supply may show definite advantages in rapid development of rural districts.

A transformation of farming activities is being undertaken in the central region of Great Britain within the areas of the Leicestershire and Warwickshire and the Derbyshire and Nottinghamshire Power Companies. These two companies, known jointly as the "Midesco," have connected up about 700 farms of all types for supply. The "Midesco" stand at the Derby Royal Agricultural Show in July showed a very complete grouping of electro-farming apparatus and attracted considerable attention.

The experience of these two companies shows that response to planned propaganda is invariably good, and demonstrations and addresses have often been requested by the inhabitants of rural communities following initial development work. In response to these demands many lectures have been given to women's institutes and similar organisations in villages throughout the areas.

The Farmer's Attitude

The attitude of the farmer to electricity supply is becoming more and more friendly, as experience shows favourable results. In general, the younger generation of farmers is far more



Distribution in Woodborough by the Derbyshire and Notts Electric Power Co.

keen to take advantage of labour-saving apparatus than the older men, who have stronger traditional ideas and ways of life; but even the older generation is acknowledging the utility of electrical processes and is changing its ideas about the value of mechanisation in its most developed form. An important obstacle to rapid development is the initial cost of connection. Those who own large farms, a long distance from the nearest supply line, can seldom afford the large outlay of capital required to cover the cost of an extension, so that some form of extended payments has to be adopted over a number of years, preferably associated with a guaranteed minimum annual consumption. When once the difficulties of reconciling the points of view of farmer and supply company have been overcome by negotiation, the process of load building becomes a steady upward development.

The Leicestershire and Warwickshire Electric Power Co. has supplied 190 parishes in its area. To do this it has erected 357 miles of high-voltage lines and 190 miles of high-voltage underground cable; in addition, there are 450 miles of low-voltage cable in the area (197 miles overhead and 253 underground). Nearly 400 farms of a very varied character (including pedigree stock, poultry, and dairy-farming) are using the public supply.

To illustrate the types of installations now working electrical equipment has been installed on a considerable scale on a number of large farms. Electric lighting and power is widely used on the 300-acre farm (230 grass and 70 arable) of a breeder and poultry farmer who has specialised in pig-breeding. Particular attention has been paid to the importance

Some Municipal Electrical Engineers

From left to right: Mr. F. H. Whysall (*Lafayette*), Belfast; Mr. W. J. Bache, Cheltenham; Mr. W. A. Parker, Workington; and Mr. E. G. Okell, Plymouth

Rural Electrification Developments (*concluded from opposite page*)

of electric lighting throughout the farm buildings, especially for assisting operations in the dark mornings of the winter. A number of lighting points are placed on the farm walls, so that the yards can be crossed at any hour without trouble.

Trouble has been experienced owing to the sows lying on some of the litter, but a light is now left in the pig-sty all night, with the result that the farmer's losses in this direction have been completely cut out.

Sheep breeding has also been assisted by electricity. Formerly it was necessary to work in the lambing season by the light of a storm lantern; now it is possible for proper attention to be given under electric lighting.

Poultry has been encouraged to lay during the winter months by extending its "working hours" with the aid of electric lighting. This has produced an increase in the eggs laid during that period which has more than compensated for the expenditure involved in the installation and running costs.

Grinding and pulping operations on the farm are done on a grinding and kibbling machine which is in continual use throughout the year. The daily output from the machine averages 6 cwt. of kibbled and ground cereals and pulping.

On the domestic electric side the farmhouse is equipped for lighting, heating, and cooking, as well as with the smaller electrical appliances.

Driving Milking Plant

Another farm in the district, having an area of 60 acres, uses electricity for a wide variety of operations. The twenty cows are milked electrically, the machine being driven by a 7-h.p. electric motor, which is more powerful than that required for driving the milking plant alone, but the motor is also used for other purposes, including operating the bottle-washing equipment, the pump supplying water for milk cooling, the boiler water for bottle cleaning, and the cow-stall washer. A 2-h.p. electric motor drives the elevator which does the stacking of hay on the farm.

In the dairy are installed a refrigerator and milk-cooling plant with a storage capacity of 100 cu. ft. On the poultry farm a four-compartment battery brooder, with a capacity of 400 chicks, is fitted with carbon filament lamps for heating. The chicks stay in these brooders for a month and are then transferred to a larger brooder which is electrically equipped. Electrical equipment is also extensively used in the farmhouse itself. Cooking is done by electricity, as well as washing, sewing, and ironing, so that the whole farm unit is operated with a minimum of labour and expense.

The area of the Derbyshire and Nottinghamshire Electric Power Co. covers about 1,500 square miles, in which there are over 300 farms of different types using electricity, and rural development has been rapid. In the entire South-east Nottinghamshire district there is only one village without a supply of electricity.

On one mixed farm there are an electrically heated, five-battery brooder, and an electrical plucking machine in the poultry section, and an electrically operated milking machine and grinding machine in the dairy section. Among the interesting applications of electricity to other usages is a herb-drying equipment on one farm specialising in herbal products. A 2-h.p. motor drives the grinding machine for reducing the herbs to powder, and an insulated heating chamber equipped with 6-kW heating elements is used to dry out the gathered herbs. This chamber is provided with thermostatic control and is electrically lighted.

A field providing a useful load which has not been generally developed is the heating of churches. In this area two churches have been equipped with tubular electric heating underneath the pews and below the windows in the upper part of the building. One of these churches has a load of 29 kW.

The lighting and heating of the numerous large private residences in rural districts has provided a valuable and increasing load, while domestic power and light in farmhouses has been developed in parallel with electric power in farming operations. It is found that the farmer's wife is a potent "salesman" for electricity once she has found the labour-saving benefits of electric lighting and cooking at reasonably low rates. While she is always occupied on a farm, the ease of running a farmhouse electrically sets her free to spend a larger part of her time on other occupations, such as attending to market-garden produce and fruit cultivation.

Success in a Difficult Area

A rural area in Central England which has presented considerable difficulties in development is that of the Tamworth District Electric Supply Co. in Staffordshire. The district is sparsely populated; its 100 sq. miles contains 35,380 people and about 7,800 dwelling-houses. Tamworth (population 8,000) is the only town of any size in the area, and the chief local activities are mining and farming.

The supply system now covers the bulk of the area, and 75 per cent. of the dwellings are already taking supply. There are now only some ten parishes without supply in a very scattered rural area with a total population of about 1,800. These parishes are to be connected up as soon as the necessary arrangements can be made for transmission.

The Tamworth Co. has developed its area rapidly through a direct policy of encouraging consumers and "selling" electrical service. As soon as supply has been made available to any section of the community, promotional activities have been undertaken to encourage the public to use electricity for all purposes. Strong publicity and propaganda have been applied, including local Press advertising, circularising of householders, demonstrations of equipment, promotion of electrical competitions, and the regular organisation of electrical exhibitions. Every facility has been provided to enable the public to become consumers and to obtain equipment, including an attractive assisted-wiring scheme, and the hire and hire-purchase of appliances. This policy has prevented any waste through interest charges on the invested capital mounting up, as new service lines yield revenue as soon as they are put into commission.

Dutch Control of Lamp Imports

THE Second Chamber of the Dutch States General has issued a printed report concerning the Government Bill for the further regulation of the imports of wire filament lamps. This states that certain members of the Chamber have pointed out that as the quota measures aim at the protection of a strongly centralised industry the danger exists that the prices of glow lamps in the Dutch inland market will rise. These members consider it necessary for the Government to keep the prices of the lamps in mind, especially as they are already very high.

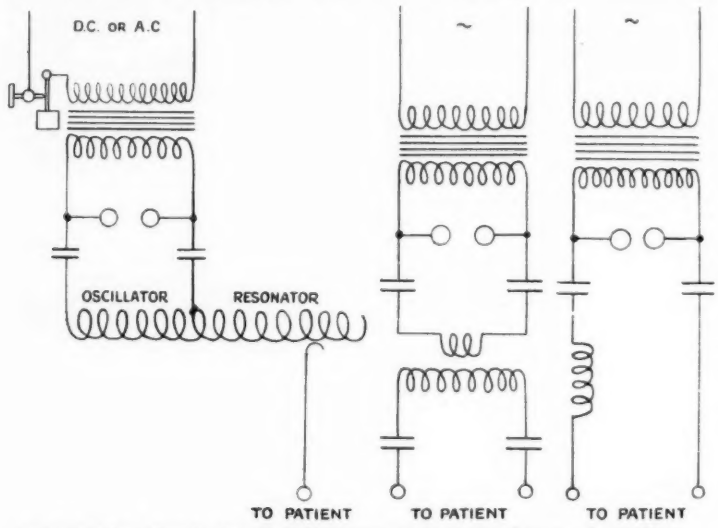
According to the Dutch official statistics, the number of wire filament lamps exported increased from 1,808,000 in July to 1,894,000 in August, and the value from about 587,000 fl. to 695,000 fl. During the eight months ended with August the value of the exports is returned at 5,508,000 fl. as compared with 7,478,000 fl. for the whole of 1932.

Electro-medical Applications. By E. H. W. Banner, A.M.I.E.E.

A review of methods and equipment

THIS account of the electrical apparatus used for electro-medical work is not intended to be a guide to the medical use of such gear, but should give an insight into the types and characteristics of apparatus required and their installation, together with the correct nomenclature. X-ray apparatus is outside the scope of the article. Electro-therapy is a very specialised science and requires both medical and electrical training.

High-frequency current and diathermy are closely allied electrically; it is only the application to the patient that is radically different. High-frequency current has the property of failing to stimulate the nerves unless actual sparks are drawn, and so much greater current can be applied than is pleasant or safe with low-frequency or d.c.



Left: Outline circuit of a high-frequency generator. Centre: A medical diathermy generator. Right: A surgical diathermy generator

In applying high-frequency current directly the current is usually passed to the patient through a vacuum electrode in the form of an effluve, the violet glow of the residual air in the electrode giving rise to the name of "violet rays" which are often confused with "ultra-violet light." The violet light of the high-frequency electrode is incidental and has no virtue of its own; it is the *current* that is effective.

High-frequency currents are produced usually with the aid of an induction coil and a Tesla coil, large sets having an induction coil capable of a six-inch needle-gap spark, or more, and feeding glass-plate condensers and a copper tube helix. Small portable sets (commonly termed "violet-ray machines") comprise a small induction coil with the Tesla coil inside the handle carrying the vacuum electrode. The primary of the induction coil may be supplied with a.c. or d.c., as a rule. A mechanical (hammer) interrupter is used so that on a.c. mains the interruptions consist of the hammer vibrations superimposed on the alternations of the supply.

With large stationary apparatus the copper helix forms the oscillator (with the condensers) and another coil, the "resonator," adjustment of a sliding contact varying the frequency and output to the patient. The result is high voltage and very small current; the waves are damped and unsustained so that, although the peaks of the voltage and current waves may be relatively high, the r.m.s. value of each is small. Little heating effect results owing to the small power, and the distribution of current at the patient is mainly on the surface of the skin. The frequency is of the order of a few hundred thousand cycles per second.

Diathermy

The output from a diathermy generator differs from the above in that the current is much greater and the voltage lower, while the frequency is also increased and the interval between the trains of waves is much less. The larger current leads to greater heating, as the heating is proportional to the square of the current. Frequently a current of three amperes is passed through the patient, the only perceptible result being one of warmth, which can be measured with a thermometer. This application, the medical one, was until fairly recently the only application, but in recent years diathermy has also been employed for cutting tissue in a form of "bloodless surgery," the local heat generated serving to coagulate the blood vessels after cutting them. On the other hand, burns from diathermy apparatus take a longer time to heal than ordinary burns.

For medical diathermy, a loose-coupled output is general instead of the auto-transformer coupling obtained with the oscillator and resonator of the high-frequency effluve generator. The frequency is higher, due to the much shorter spark gap, the electrodes of which are usually of tungsten to assist rapid quenching, and to a smaller capacitance in the condensers.

For surgical use a slightly different circuit is used and directly coupled; to prevent lower-frequency current passing to the patient condensers are inserted in series. The main condensers are of still smaller capacitance and the frequency approximates to a million, whilst that of the medical generator is roughly half this. Dual-purpose generators have a switching arrangement to alter the circuit and the capacitance.

To obtain the higher frequencies necessary for surgical diathermy valve generators have been used. The limitation of the spark-gap as to maximum frequency that can be generated is obviated, as the valve has no such limits at this order of frequency. An ammeter of the thermal type is usually fitted to a medical diathermy set, but its readings are not of much value: the heat developed is proportional to I^2R, and R, the body resistance between the electrodes, is by no means constant for different patients or for different applications to the same patient.

The consumption of diathermy apparatus varies with the size of the plant and is usually from about 300 W for small portable gear to 2 kW for heavy gear capable of continuous use and passing several amperes through a patient. Primary tappings to suit various mains voltages are common. For use on d.c. mains a small inverted rotary convertor is usual.

Ultra-violet Light

In general this treatment may be used as a tonic for persons in good health, or as a local application to cure a specific trouble. In addition to the visible light from an arc, some ultra-violet is produced, the amount of the ultra-violet depending on the nature of the electrodes. Arcs are either in air or in mercury vapour: the former may have electrodes of any conducting material, while the latter are essentially mercury vapour.

Schall's "Pantostat," combining apparatus for various treatments

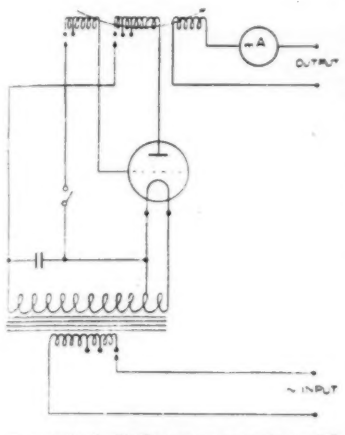
For a general tonic radiation having a wavelength longer than 3,000 Angstrom units is usual, as such rays are more penetrating and do not have such a violent skin reaction. On the other hand, the shorter rays are better for local therapy. Some firms manufacture one type only and recommend it for both purposes. If a single arc is being run a.c. is more economical in running cost, as the necessary low voltage may be produced with the aid of a transformer. On d.c. the reduc-

tion of voltage by resistance is a dead loss; this can be reduced by running two or more arcs in series.

Carbons are usually cored either with soft carbon or impregnated with salts similarly to the old flame arcs. Iron cores are also used on a.c., whereas tungsten electrodes can only be run on d.c. With this limitation tungsten electrodes are a useful source of generation of ultra-violet radiation.

The necessary current for arc lamps is usually from about 10 to 30 A, so that the wiring needs to be sufficient for the purpose. There is considerable visible and also infra-red radiation; the latter is often useful as local heat.

Mercury vapour lamps comprise two mercury electrodes in quartz, this being the only material that can be used as it is transparent to the short ultra-violet rays, whereas glass is not. The light from this type of lamp is of very short wavelength, and in general it is of more use for local treatment than the carbon arcs. The mercury vapour lamp will run from a.c. or d.c. mains, but the control and regulating mechanism may be such as to work on one supply only. The quartz burner for a mercury arc lamp has an effective life of about 1,000 hours and its running cost is low. Carbon arcs burn at about one inch per hour and generally consume more current. Tungsten arcs burn less rapidly, but the cost of the electrodes is considerably greater.



A surgical diathermy generator with valve

Of recent years several firms have catered directly for the public by supplying incandescent lamps for general irradiation in the home. A special glass is used to transmit some of the ultra-violet, and by overrunning the lamp some ultra-violet light is actually passed. Lamps are usually of 300- to 500-W rating, and the majority have a short life, often only 100 hours or so. With this limitation such lamps are quite useful as a general tonic, although of little use for the professional treatment of diseases.

Infra-red rays are generated by most electric radiators and are beginning to come into use for treating specific troubles. The arc lamp generates considerable infra-red rays, whereas the mercury vapour lamp develops little heat. Bowl and other fires having efficient reflectors are also good generators of infra-red rays.

Galvanism

This is the term given to the passage of d.c. through the body. The effects are electro-chemical, or electrolytic, and, in fact, in some treatments salts are actually passed into the body by means of electrolytic action.

The current may be applied either continuously or intermittently; if the latter, usually some form of mechanical rhythmic interrupter is used. No sensation is felt with the steady current, but sudden variations, either switching on or off or regular interruptions, give rise to muscular reactions. Small portable galvanic sets contain dry cells with a selector switch. Larger apparatus for mains use has a rheostat connected as a potential divider and lamp resistances. The voltage applied is not more than 60-80, and the moving-coil milliammeter almost universally is a three-range one of 5, 50 and 500 mA. Frequently currents of only a few milliamperes are required. Various terms are used, in addition to the generic term galvanism; for destruction of tissue "electrochemical cauterisation," "surgical ionisation," and "electrolysis" are used, while for passing drugs into the system "medical ionisation," "ionic medication," and "iontophoresis" are common terms.

Faradism

Intermittent current of irregular waveform supplied by an induction coil is called by the generic term of faradism. Generally the secondary coil is used for the output, the current actually alternating, although irregularly. Sometimes the primary effect is used where the current is interrupted but does not reverse; the patient is connected across the contact-breaker in this case. The "medical coil" of common knowledge is a faradic generator. As with galvanism, the current is actually passed through the patient, and it may be directly applied or through a rhythmic interrupter of a few cycles per minute.

The faradic current gives rise to the well-known tingling sensation, the contraction of the muscles being due to the *break* of the primary circuit. Variation of current strength applied to the patient is effected by variation of coupling, either by moving the secondary coil or the core. Primary batteries are the usual source of supply to induction coils, but accumulators are useful for heavy-duty apparatus. Occasionally a combined galvanic and faradic current is required; the two supplies are connected in series with the galvanic current in the same direction as the *break* induced current.

The resistance of the body to low-frequency a.c. is less than that to the galvanic current and the resistance is lower still to high-frequency currents, provided that the contact is the same in each case.

Sinusoidal Current

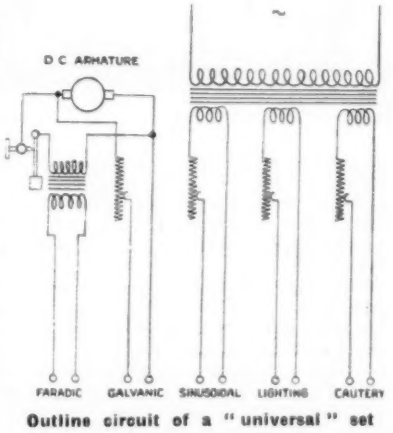
Alternating current of supply frequencies is used for treatment and termed sinusoidal to distinguish it from the steep wave-fronts of faradic supplies. As the mains are commonly employed the precautions necessary to ensure safety of the patient are as for galvanism from d.c. mains, but it is much simpler in this case as a double-wound transformer of the necessary voltage output is all that is necessary—60 V maximum is usual. The alternative supply to a.c. mains is a small machine, either an inverted rotary convertor or a double-wound motor-generator, such as is described later. As with the previous two forms of supply, a rhythmic interrupter, clock-work or motor-driven, may be used.

Power for Cautery and Light

It is often required to supply current for heating cautery burners and for small local inspection lamps. Either d.c. or a.c. will serve equally well, and a few volts and a few amperes, about 20-50 W, are required. Dry cells are rarely of use and accumulators are usual if no a.c. mains are available, owing to the waste of power in reducing d.c. mains voltage to the low voltage required.

Whilst portable sets to supply current for galvanism and faradism are common, an alternative is a "universal" set supplying both the above, and in addition, sinusoidal current and often current for cautery and local lights. These machines, of which the "Pantostat" is a well-known example, are usually supplied alternatively for d.c. or a.c. mains. Actually the machine is almost always a motor-generator with a double-wound armature; the motor being suitable for d.c. or a.c. mains as required. The d.c. mains model usually has a secondary armature winding with a commutator and slip rings. From this all supplies required can be taken, and there is, of course, no connection with the mains.

The motor is of the order of 1/6 b.h.p. and requires about 400-500 W to run, although the motor starting current is momentarily more. Each supply has separate controls, but if required various supplies can be combined, a sinusoidal current superimposed on the galvanic current, for example.



Outline circuit of a "universal" set

For a.c. mains the machine supplies d.c. for galvanic and faradic purposes only (the latter through some form of induction coil), all other supplies being from separate secondaries on a double-wound transformer. In this way each supply is independent of the others and of the mains as regards direct contact. A somewhat different set is the "Solustat," which is for a.c. mains only, and instead of a motor generator has a transformer and rectifier for the galvanic supply, thermionic valves being used.

Success of Co-partnership and Hospital Schemes

Addressing the annual meeting of the Mid-Southern Utility Co.'s Co-partnership and Hospital and Benevolent Fund last week, Mr. R. W. Edwards, chairman of the company, said that the number of members, the amount paid in the shape of bonuses, and the interest credited on savings all constituted records last year; savings, however, were a little less, despite the five per cent. interest payable. The work of the Hospital and Benevolent Fund continues to expand, and since the Fund commenced in 1917 a total of £1,083 has been paid in subscriptions to hospitals and homes.

Warming Buildings by Electricity. By J. Lesser

The report of the E.D.A. Industrial Heating Committee

ALMOST important work has just been issued by the E.D.A. entitled "Warming Buildings by Electricity." It is a handbook for the use of electricity salesmen throughout the country, and should prove an invaluable aid in developing the electricity supply industry in a peculiarly difficult field of operation. Many valuable works upon the subjects of heating and ventilating already exist, but they are all highly technical and of use mainly for reference upon specific matters. Furthermore, they were written with particular regard to solid or liquid fuel-fired boiler systems. During the last few years some publications have appeared dealing with the electrical warming of buildings, and whilst these have disclosed much that is valuable to the specialist they have been too academic to be of much assistance to electricity salesmen and have also tended to surround the subject with mystery.

Men who have been actively engaged during recent years boldly presenting the challenge of electricity in the field of warming buildings and have succeeded in penetrating a stronghold hitherto securely held by competing fuels have pooled their knowledge and experience for the benefit of electricity supply salesmen who must now with equal boldness follow their lead.

A Wide Scope

"The market for building warming in Great Britain is a very extensive one, the size of which may be estimated from the fact that approximately 8 per cent. of the total sum of money spent in building construction is spent in the provision

A view of the coal-handling plant at the new Battersea station

of heating apparatus. The electricity salesman has before him a market for electric warming covering every class of building, from the cottage to the mansion, and from the village shop to the big drapery store, cinema or hotel." So run two paragraphs in the brief introduction to the new E.D.A. handbook.

The opening sections state and explain the dominant purpose of warming equipment within a building and also the methods of warming hitherto employed. Progress is necessarily slow as the vast majority of existing houses are already provided with fireplaces and gas points, and there is a certain natural reluctance on the part of occupants to undertake the initial cost of changing over to electricity. Furthermore, there is still a large amount of development work to be carried through in providing, extending and enlarging the capacity of distribution mains and existing house mains. But the public is becoming "electrically minded," and there can be few in the electricity supply industry who have not been charmed to hear an applicant express a determination to have his or her house or business premises "all-electric."

Fuel-fired Boilers Entrenched

The main challenge of electricity as a heating agent for the warming of buildings is undoubtedly directed against solid or liquid fuel-fired boiler systems. These have hitherto been so widely adopted that architects and others equip buildings with such systems as standard practice. The progress of the art of building construction has been rapid, and modern buildings are now a much bigger affair than, say, only thirty years ago. The old method of fireplaces in every room became an impracticable and also a laborious system of warming. It was right to concentrate all the work in one central position. A new industry sprang up to meet the requirements of heating engineers, and with the passing of the years important business connections associated with that industry have been made.

This is one of the main obstacles that electricity supply salesmen will have to reckon with; people do not lightly break away from long-standing business relationships. The protagonist of electric warming is therefore called upon to make out an almost overwhelming case in favour of electricity against fuel-fired boilers. The E.D.A. book provides him with considerable information for this purpose. Particulars are given regarding the advantages of electricity in reducing labour and building costs, in cleanliness, economy in operation, automatic control, spring and autumn heating, reliability and safety of apparatus, higher warming efficiency, and the ease and low cost at which alterations can be effected to suit occupants' requirements. A whole section of the book is devoted to the economics of electric warming.

Responsibility for Design

Electricity supply salesmen must understand that they themselves are expected to design the layout of an electric warming scheme for any building. Hitherto the practice has been to throw this vital part of the work on to the manufacturer. It is not good enough. The manufacturer is left to negotiate with third or fourth parties, and cannot drive home the salient points of advantage to the person that matters. The man who designs the layout of the scheme does the original thinking. It is he who has made it his business to understand heating as such and knows the advantages and limitations of different forms of heat. He studies the plans of the building and the purposes for which it is to be used. He asks necessary questions of the owner or architect upon preliminary matters, and when his scheme has been drawn up he is the best man to explain it, and if necessary defend it from attack.

The electricity salesman can begin with small installations for private residences and also small suites of offices. He will make his mistakes and have to correct them, but his chief should give him encouragement and support. The comparatively small expense involved in correcting initial mistakes must be met by the undertaking as part of its outlay on advertising and propaganda. Within a season or so the salesman should have gained sufficient knowledge and experience to undertake the larger propositions that will inevitably result from his own activities and those of his chiefs.

Meeting Misrepresentation

The sections of the E.D.A. book dealing with "Building Heating Calculations" and Appendix B giving data and costs in connection with fuel-fired boiler equipment should prove very instructive. Early in the struggle the salesman will encounter the "B.th.u. argument." It is based upon the fact that one kWh is equivalent to 3,410 B.th.u. The gas industry therefore states that one therm of gas is equal to 29 kWh of electricity—a statement so preposterously misleading that it has defeated its purpose—and the solid and liquid fuel interests also readily state the calorific value of a pound of fuel to demonstrate to the innocent minded that electricity will have to be supplied at next to nothing if equal value is to be given. These are the arguments of desperate men.

The whole question depends upon how many of the B.th.u. can effectively be used for the purpose required. Everybody knows the tremendous wastage of heat that accompanies a fuel-fired boiler system owing to the over-rating of the boiler capacity in relation to the service actually required, to bad stoking, to difficulties in temperature control, and to defects inherent in such systems. Losses through essential ventilation and low thermal efficiency of apparatus employed are responsible for 60 per cent. of the B.th.u. in one therm of gas as it is usually employed.

Compare all this with the position of the electricity salesman. In the first place he is selling the finest product of the century the virtues of which are already well known. People are prepared to pay more than the cost of gas or other fuels to secure the advantages associated with electricity, as the development of the use of electricity for lighting proves. In the second place, electrical heating apparatus is now available which enables all the heat in a kWh to be employed effectively. Time switches and thermostats automatically control the room temperature, and the heating system can easily and cheaply be expanded or contracted to suit the changing requirements of owners and tenants.

The electricity salesman will find much useful information in the chapter of the E.D.A. book dealing with the warming of churches, schools, offices, public buildings, &c. The illustrations of some of the buildings already equipped together with consumption records are in themselves almost sufficient to support the claim of electrical methods for the warming of buildings.

Bus-bar and Feeder Reactors. By B. G. Gates, A.M.I.E.E.

Advantages of the toroidal type

THE interconnection of large power stations by the national grid scheme has increased the available short-circuit power at the bus-bars to such an extent that, in many cases, it has become necessary to include artificial reactance in the circuit in order to reduce the magnitude of the short-circuit currents to a figure within the capacity of existing switching apparatus.

The type of reactor employed depends upon the normal rated voltage and current of the circuit; whether the apparatus is for indoor or outdoor installation; and the maximum value to which it is desired to limit the short-current.

There is a number of types of reactor available among which are the following: (1) Open solenoidal type, with air core; (2) solenoidal type with air core immersed in oil; (3) iron-cored type with air gaps to prevent magnetic saturation of the iron; and (4) the toroidal type.

The merits and demerits of the various types may be briefly summarised as follows:—

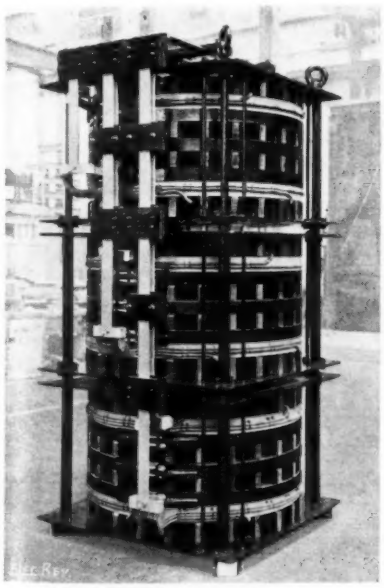
[*Elliott & Fry*

Mr. B. G. Gates, formerly of the Engineering Department of the British Electric Transformer Co., Ltd., is now studying power transmission problems

Type 1 is very robust but has a very large stray field which makes it essential to place the reactor so that this field does not reach any masses of metal and so that the fields due to the reactors in the three phases do not interact with one another.

Type 2 is equally robust and by the provision of a shielding coil inside the tank its stray field is reduced to a negligible amount: in addition the tank can be made weatherproof if desired, but it is not permissible to mount all three phases in one tank. In spite of the shielding coil a certain amount of the stray field cuts the tank sides and causes an appreciable extra loss.

Type 3 is even more robust than Types 1 or 2, owing to the excellent support provided for the windings by the iron core, and its stray field at normal loads is practically nil. So long as the magnetic circuit is sufficiently generously designed, there is no fear of interaction between phases on short-circuit, so that three units may be mounted together in one tank forming a very compact arrangement. However, when the short-circuit current to be carried becomes very high in proportion to the normal load current the dimensions of the iron core reach prohibitive figures with consequent excessive cost.



A 20,000-kVA reactor removed from its tank

The Toroidal Pattern

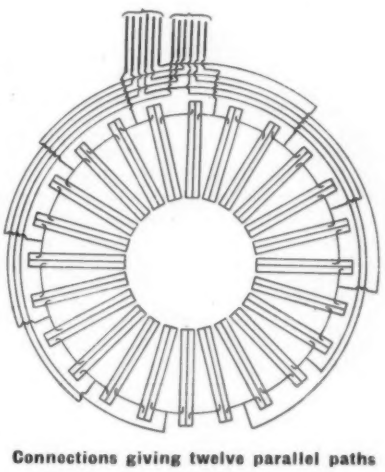
To retain the advantages of the iron-cored type and at the same time to permit of economical design with high ratios of short-circuit to normal current, the toroidal type was developed. The toroid or anchor ring is a very old idea and its properties with regard to absence of external field are well known, but, so far as I am aware, this form of coil has not previously been employed for large reactors of the type in question. The principal difficulty met with in adapting this form of coil is that of providing adequate support to withstand the heavy short-circuit forces.

After considering several alternative designs, the arrangement shown diagrammatically was adopted. In this, twenty-four coils are arranged as the equally spaced radii of a circle. These coils are wound on the same type of former as is commonly used for winding coils for shell-type transformers and are therefore of perfectly standard construction. With the exception that half of the coils are wound in the opposite direction to the remainder, all coils are similar. The centre of the reactor consists of a stout steel tube welded to a base-plate; over this tube is placed an insulating cylinder shrunk into position, and the inner edges of the coils, encased in insulating "U" pieces, are held firmly in position around this as described below. The inside of each coil is supported by suitable "crown" blocks and stretcher pieces, and the coils are separated from each other by stout insulating wedge pieces and vertical washers. Both the outside straight edges of the coils are fitted with "U" pieces and the top and bottom curved ends of the coil are fitted with "crown" blocks shaped to fit them and to insulate them from the end plates.

Coil-fixing Methods

The twenty-four coils are securely held against radial movement by adjustable steel bands designed to withstand the maximum short-circuit forces with an ample margin of safety. The coils are held vertically between two stiff end-plates held together by adjustable tie-rods, but care is taken to leave a gap between the top plate and the central cylinder in order to avoid the formation of a short-circuited turn linking with the magnetic field of the coils.

The end-plates and the wedge spacing pieces are drilled to permit free circulation of oil for cooling and to prevent the formation of pockets of trapped air or gas which might cause ionisation and ultimate breakdown of the insulation. The provision of adequate cooling is vital in all reactors, as under short-circuit conditions heat is generated at an enormous rate, and it is essential that this heat be transferred as rapidly as possible to the oil, so that the reactor may soon be ready to carry its normal load again after the short-circuit is cleared.



Connections giving twelve parallel paths

Three single-phase units are mounted one above the other to form a three-phase set. The ties between the three units are so arranged that the lower units are not called upon to support the weight of those above them, and at the same time the pressure of the upper clamping plates can still be adjusted in the completed set.

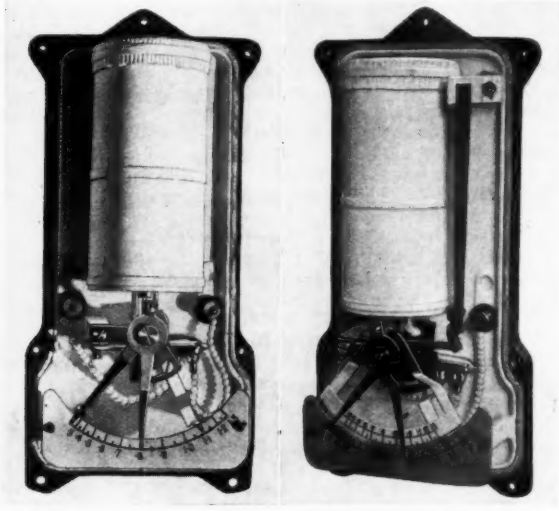
The connections between the coils are made by insulated cables securely fixed to insulating bands surrounding the reactor. With this type of reactor it is very easy to provide a large number of parallel paths. The arrangement of twenty-four coils to give twelve paths in parallel illustrated is a valuable one, as it makes it possible to select a size of strip conductor suitable for winding the most rigid type of coil and at the same time obviates the necessity of making crossovers which would be very undesirable. That this arrangement is effective is well shown by the fact that the reactors mentioned later which were designed for a current of 1,100 A had an eddy-current and stray loss at full load of less than 5 per cent. of the ordinary I^2R loss. The windings are insulated to withstand full line voltage between turns throughout to prevent failure due to surges.

Two large three-phase units of this type have recently been built, each designed to carry a continuous load of 20,000 kVA at 11,000 V and to withstand a short-circuit of 500,000 kVA without damage. The phases are only separated by a few inches but there is no interaction between them.

The toroidal form of reactor has been developed by the British Electric Transformer Co., Ltd.

Load Indication on Distributors

IN order to make the maximum use of capital expenditure on distribution the true relationship between the thermal characteristics of any part of the network and the load must be known. As short overloads, even if substantial, may be well within the capacity of the system, the instrument used for ascertaining the true heating conditions should have a relatively long time constant, which—for practical reasons—



Standard and compensated types of "Poynder" indicator

would be somewhat less than that of any apparatus likely to be connected.

With this in view Messrs. Adamson, Green & Co., Ltd., Felling-on-Tyne, have developed the "Poynder" load indicator, which is operated by the action of a heating element on two bimetal strips, maximum temperature being reached in from 2 to 2½ hours. In addition to its moving pointer, the instrument is fitted with a resettable friction-gripped pointer which gives the maximum reading attained since the previous inspection.

It is intended for use in conjunction with a current transformer having a secondary current of 5 A at normal load; the unity point on the scale corresponds to 5 A sustained load at 60 deg. F. ambient temperature. Its dimensions are 9 in. high by 4½ in. wide by 3 in. deep. In the standard model the temperature of the bimetal strips is approximately that of the copper in the apparatus in circuit at the corresponding load and is affected to the same extent by varying ambient temperatures. A higher loading is therefore permitted in winter than in summer.

Temperature Compensation

Temperature compensation can be included if required for statistical purposes at a slightly higher cost. In this type a second (red) scale, mounted on a pivot, is fitted concentrically with, but inside, the ordinary (black) scale; the second scale is linked to another bimetal strip inside the case. The pointers move over both scales, which are graduated on their adjacent edges, that on the compensated scale being friction-gripped to the other. The angular position of the red scale relative to the black depends upon the temperature within the instrument but external to the thermal element.

Where close information regarding load balance is required, one instrument per phase is required, but for ordinary purposes a special type can be supplied fitted with a third terminal on the centre of the heating element and so connected in circuit that a single instrument will give a close approximation of the mean load.

The mechanism is so designed that the scale is almost equally divided between three-quarters load and 10 per cent. overload.

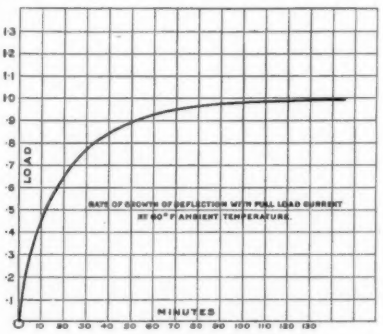
Overload Protection

The "Poynder" load indicator can be provided with mercury switches for operating the tripping circuit of an oil switch, affording overload protection with relatively long inverse-time characteristics with instantaneous operation under heavy faults. For ordinary individual circuit protection the mercury switch is connected in series with a small slide-wire resistance to form a shunt across the trip coil, reducing the current in the latter to one-third. So long as the mercury switch is closed the oil switch will not trip unless the current in the secondary of the c.t. reaches 15 A (three times full load). For smaller overloads the oil switch will not trip until the shunt circuit is broken by the indicating pointer tipping the mercury switch. Thus the combination normally gives inverse time element protection for overloads of less than 200 per cent., and instantaneous protection for greater overloads, but can be easily adjusted for other settings.

When the trip index is 1.2 of full rating the typical times to trip on 25 per cent. overload from no-load and 70 and 100 per cent. overload are 82, 67 and 49 minutes and on 100 per cent. overload 17, 11 and 5 min.

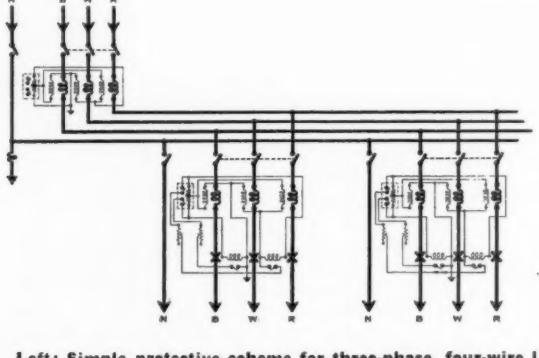
Where a transformer of substantially smaller capacity than that of the outgoing lower-voltage feeders is installed in a sub-station it may be protected from overload by tripping these feeders, one at a time, until the load has been reduced to a safe figure. Sustained overload on the incoming feeder will cause its indicator to open the mercury switch and inject current from its c.t. into the trip circuits of the switches of the outgoing feeders in an additive sense.

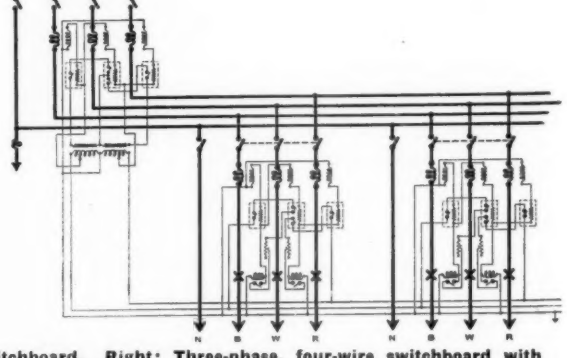
The current injection can be effected either in series or in parallel. The latter is the simpler, the only additional apparatus required being a small auto-transformer for adjusting the injected current; if one feeder has an appreciably greater load than the others, in terms of its c.t. capacity, it alone will generally be opened. Series injection gives better discrimination, and can be arranged to give pre-selection where the outgoing feeder loads are approximately equal, but it involves a separate switch for the trip circuit of each, preferably operated by a separate series relay in the injector circuit. With series injection the auto-transformer is preferably replaced by a double-wound transformer and no special short-circuiting winding is required, as is the case with the auto-transformer.



Rate of movement of pointer over scale with full-load current

Prices range from £2 10s. to £3 15s. per instrument, depending on the type and the number of switches.

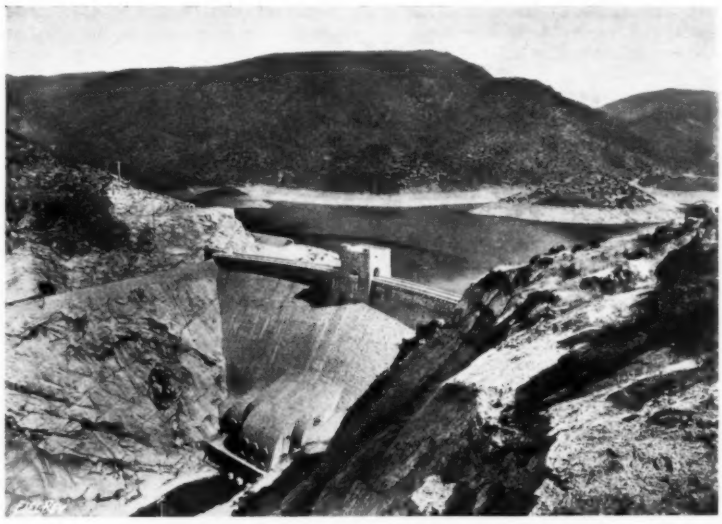




Left: Simple protective scheme for three-phase, four-wire l.v. switchboard. Right: Three-phase, four-wire switchboard with parallel injection protection.

An Andalusian Power Station

THE outstanding feature of the Jandula hydro-electric power station which utilises the water of one of the principal tributaries of the upper Guadalquivir in Southern Spain is that it is built entirely in the dam of the power development. This dam is a solid gravity type dam of concrete 306 ft. high and having a length of 720 ft. at the crest. The machine room as well as the rooms containing the h.p. switchgear are in the form of vaults at the base of the dam, the outer walls being up to 10 ft. thick.



A view of the dam with the power station built into it

The power station is equipped with three vertical generating sets; two of these have a capacity of 7,500 kVA, while the third develops 3,750 kVA, at 10,000 volts, 50 cycles, three-phase. The water turbines were supplied by Messrs. Th. Bell & Co., of Kriens (Switzerland), the generators being built by the Oerlikon Co.

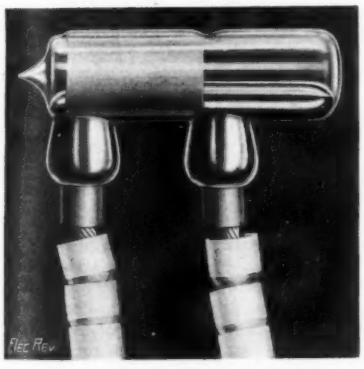
The generators are provided with a pneumatic braking device, which brings the machines to a standstill within a few minutes. All generators are of the self-ventilated type, the cooling air being drawn in from the intermediate floor of the power station and the warm air being led away through lateral openings in the generator casing, which communicate directly with the outside through the wall of the building. The machines are thus completely cut off from the machine room.

All three generators are connected directly to a common bus-bar system. The pressure is stepped up from 10,000 to 70,000 V by means of two transformers having each a capacity of 11,250 kVA, with delta/delta connection. The pressure can be raised to 121,000 V by changing from delta to star connection.

The power station operates in conjunction with a water regulation scheme and works on full load during the summer months only, when water is required to raise the level of the Guadalquivir which would otherwise be no longer navigable.

Mercury Switch Production

THE Mercury Switch Manufacturing Co., Ltd., was formed comparatively recently for the manufacture of high-class mercury switches, and arrangements were made with Messrs. Muth & Company of Nürnberg, who had specialised in the manufacture of such switches for many years, by which the whole of the experience of the German manufacturers was put at the disposal of the English firm.



A mercury switch with a ceramic liner

In many instances mercury switches can replace successfully metal contact switches with a substantial saving in first cost and cost of renewals, and in many cases metal contacts cannot conveniently be used at all, particularly for comparatively heavy currents. For instance, heavy-current metal contacts are unsuitable for thermostatically operated switches, because the very gradual movement brought about by slow temperature changes would cause very slow breaks, which are detrimental to metal contacts.

By the inherent snap break of the mercury switch, however, delicate thermostatic devices can be made which are absolutely dustproof and flameproof, and avoid the complication of the spring-over centre device or magnetic snap action, both of which must necessarily increase the differential of the temperature variation between make and break.

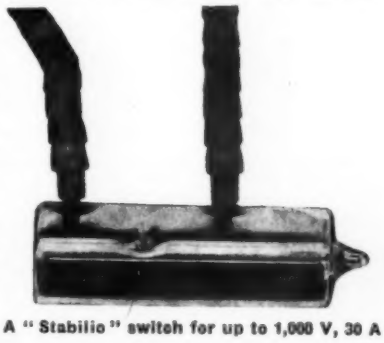
For this particular application the company has switches with a ceramic liner in that portion of each switch in which the break takes place, thus avoiding the possibility of the arc burning the glass. A switch in which the ceramic liner is fused to the glass eliminates all possibility of a mercury bridge underneath the liner between the contact cups.

Mr. B. R. Wingfield, managing director of the company, reviews the equipment generally and broadly from the application point of view by drawing up three classes of switches: first, those for use in such automatic control equipment as temperature, pressure, lever-operated, and signal switches; secondly, equipment for use in electric relays in place of automatic metal contacts; and thirdly, switches for such special applications as transformer tap-changing gear, voltage regulators, &c.

Switches of the first class may have to comply with special conditions, *e.g.*, those for thermostats have frequently to work with a very small angle of tilt. They must therefore be able to withstand considerable arcs which may arise with the unavoidable slow break caused by thermostatic operation. Lastly, they are very frequently strictly limited as to the size which can be accommodated.

Small Tilting Angles

Switches with tilting angles of up to 1½ deg. only give reliable operation, the rupturing arc being taken care of by special ceramic liners which are fused to the glass. The special quartz glass used will withstand very high temperatures.



A "Stabilio" switch for up to 1,000 V, 30 A

The conditions for switches in the second group are less exacting, because the operation, as a rule, is such that quick make and break takes place, so that more standard switches such as the company's type "A" can be applied. The most exacting conditions, however, occur in the third of these groups, in which switches are necessary which not only will carry normal heavy currents of up to 80 A, but which must be safe at ten times their normal load, and must withstand open-circuit voltages up to 20,000. Such switches again need the greatest care in the selection of the materials employed, and the glass liners and contact materials require very special treatment in order to withstand the high voltages which occur on open circuit.

The switch cases are of high-quality glass, and all the contacts and leads are graduated for carrying capacity to reduce switch resistance to a minimum. The contacts are electrolytically cleaned by a special process, and all the contacts in switches of one type and size are made uniform to gauge.

Battersea Power Station

ON St. George's Day, 1931, the stone laid to mark the inception of Battersea power station and to commemorate the discoveries of Michael Faraday was unveiled, and in our issue of March 18th, 1932, we published an article on the main technical features of the first section. We also reproduced some photographs which we took to show the progress of the work at the time and certain interior arrangements that would not be visible at a later date. On page 377 of this issue we publish some further photographs illustrating the station as it is this week.

Since our previous article consent has been given by the Electricity Commissioners to the London Power Company to add a 105,000-kW unit to the two 67,200-kW sets now being installed. The present plant consists of six Babcock & Wilcox boilers with an individual capacity of 330,000 lb. per hr. and steam conditions of 625-lb. per sq. in. and 875 deg. F. The furnaces have Bailey walls and the stokers are of the Taylor retort type. The steam drums are solid forged. The two 67,200-kW m.c.r. 500-r.p.m. turbo-alternators were made by the British Thomson-Houston Co. and the Metropolitan-Vickers Co. to the same specification. The steam end consists of h.p., i.p., and double-flow l.p. cylinders in line, exhaust being to Richardson Westgarth condensers.

Steam admission to the h.p. cylinder is controlled by four governor valves, arranged two in each steam chest on the sides of the h.p. cylinder, which deal with loads up to the most economical rating of 52,800 kW. Four governor valves (two in each steam chest) by-pass the first nine stages for loads above that figure. Five stage bleeding will be used.

Each alternator has a kVA capacity of 80,000 and generates at 11 kV 50 cycles; to it is coupled a 6,250-kVA service generator and an excited group. The overall length of each set is 102 ft. The stator of the alternator weighs 120 tons; the frame structure is built up of welded steel plates. The solid rotor weighs 64 tons and is built up from three forgings spigoted together and secured by long high tensile steel links which are shrunk into position. The alternator terminals will be directly connected to the Ferranti 80,000 kVA three-phase step-up transformers, and main switching will be at 66 kV by M.V. circuit breakers.

The 105,000-kW turbo-alternator, which is to be provided by the Metropolitan-Vickers Co., is the largest set yet built in this country. The turbine will be of the three-cylinder impulse type designed for steam condition of 600 lb. per sq. in. (gauge) and 850 deg. F. The l.p. cylinder exhaust will be of the double-flow type, incorporating a Metrovick duplex multi exhaust in each flow. Generation will be at 11 kV. A 5,000-kW 3-kV service generator and an exciter group will be coupled in line, and the overall length of the set will be 120 ft.

Not the least interesting feature of this station is the method developed by the London Power Co. to prevent sulphur emissions from the two chimneys, the total height of which is 325 ft. This plant has been referred to on many occasions in these columns, the most recent being in our issues of July 14th and 21st. Battersea is the first station in the world to be equipped with sulphur-elimination plant.

Another noteworthy feature of the station is the 10-ft. concrete cable tunnel under the Thames which terminates in a concrete chamber 20 ft. below ground on the opposite side of the river, whence the cables diverge into trenches.

Block Batteries

LITTLE more than a year ago, Block Batteries, Ltd., commenced to manufacture accumulators at Abbey Road, Barking, but already a new factory has been built and high-voltage radio batteries are now being made in addition to low-voltage cells. The new works are situated on the London-Tilbury Road (Barking By-pass) and are equipped with motors and sub-station plant, including transformers, switchgear, and a motor-convertor, supplied by the English Electric Co., Ltd.

The supply to the premises is taken from the 6,600-V, 3-phase, 50-cycle network of the Barking Corporation Electricity Department, the actual connection being made by a single short length of e.h.p. service cable running from Messrs. Scoffin & Willmott's sub-station, situated on the northern side of the Barking—East Ham By-Pass Road. This service is controlled here by one panel of a five-panel cubicle-type switchboard by the New Switchgear Construction Co., Ltd., and the supply is metered by means of Metropolitan-Vickers meters, mounted on an oil-immersed Allen West circuit-breaker of the horizontal, draw-out, isolating type, erected in a space reserved for the Corporation by the consumer. From the outgoing side of this panel a short length of cable runs to the bus-bars of the consumer's switchboard, and the supply from that point is under the control of the consumer only.

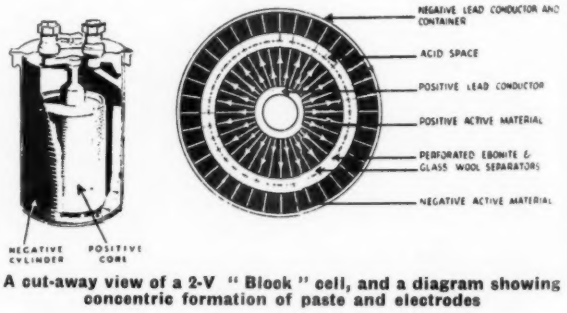
The tariff for the consumer was the subject of some negotiation, and the agreed terms are £4 10s. per kVA of maximum demand per annum, plus 0.41d. per kWh, based on coal at 15s. per ton, with an adjustment of 0.0075d. per kWh for each variation of 6d. per ton.

In addition to what may be called the normal duties of the Corporation, the Electricity Department drew up the necessary lay-out and specification for the lighting installation and the wiring for power purposes. The tender of the Corporation was accepted, and the whole of this work has now been completed under the supervision of the borough electrical engineer, Mr. W. E. Kidner, A.M.I.E.E.

The Mayor of Barking inspecting manufacturing processes

The inaugural ceremony was performed on Thursday last week by the Mayor of Barking, Alderman Col. A. E. Martin.

The " block " accumulator is of unconventional construction, patented by Mr. Leonard Fuller, chairman of the company; in appearance it is more like a primary " dry " cell than the usual accumulator. It combines the compact portability of the dry battery with the rechargeability and uniform service of the ordinary accumulator, and it minimises some of the inherent disadvantages of both. In appearance, too, it is uncommon, being enclosed in an elegant coloured bakelite casket instead of the usual heavy glass, celluloid, or ebonite container.



A cut-away view of a 2-V " Block " cell, and a diagram showing concentric formation of paste and electrodes

The accumulator is of the lead-acid type, and its capacity is large in relation to its convenient size and weight. The 60-V, 5,000-mAh wireless battery weighs 16lb. with acid and measures 14¼in. by 4⅝in. by 5¼in. high, including the lid. A capacity of 80 Ah is obtainable from a cylinder 7in. high.

There are no " plates "; instead a cylindrical lead canister, coated internally with the negative active material, is both the negative electrode and the battery's real container. Next to the paste are perforated ebonite and glass-wool separators, and then the positive active material is added, packed round the central perforated lead core that forms the positive electrode.

The paste is packed solid by machines, eliminating the need for lead grids; thus weight is reduced and the proportion of available active material is increased. Moreover, the concentric cylindrical form enforces an even radiation of current from the centre to the circumference through every particle of paste, unhampered and undeflected by inactive grids. The electrolyte is sulphuric acid.

The high-voltage radio battery is assembled in a rectangular outer case with terminals at the side, the low-voltage cell being cylindrical with terminals at the top. A convenient leather carrying handle is provided in both cases, while a moulded combined miniature lampholder and switch clamped to the side of a 2-V cell by means of two terminal strips converts a battery into a neat hand lamp.

Correspondence

Correspondents should forward their communications as early as possible. No letter can be published unless we have the writer's name and address in our possession

Round or Flat Pins?

The recent correspondence in your columns on the respective merits of circular and strip or section contacts is of interest and serves to show the diversity of opinion on the subject which exists even amongst the most experienced manufacturers and users. Perhaps the particulars of a test carried out by the National Physical Laboratory on a 100-A pin-type fuse may throw some light on this matter.

The patent form of contact was one in which the hard-brass plug is made some few mils *larger* than the socket, both being provided with two slots at right angles. The plug was $\frac{5}{8}$ in. in diameter, and 1 in. long. This form of manufacture ensures a good fit even when the finished sizes of plug or socket may vary within reasonable limits.

The voltage drop across the top contacts at full load (100-A) was 0.00977 V. This value was obtained just after the start of the heating test of six hours at full load, when the contacts were comparatively cold. A second measurement, made towards the end of the heating test, when the contacts were hot, gave 0.00967 V, a small decrease.

The loss shown of only 1/10th of a watt for a contact carrying 100 A for many hours represents an efficiency not approached by any commercial form of strip contact having the same area. Many tests of the latter within our knowledge have proved that a loss 600 per cent. greater (i.e. 7/8mV) is quite a good result. CASTLE FUSE AND ENGINEERING CO., LTD.

Liverpool, *September 18th.*

The Victoria Station News Theatre mentioned on page 402 of this issue. Our photographs show the imposing exterior, which is actually in the station (note the locomotive), and examples of the very modern interior lighting

Diversity Factor

In your issue of September 15th Mr. Shackleton comments on two points in my article entitled "A Domestic Tariff." His first objection is due to a printer's omission of the word "or" between "generating plant" and "the undertaking's maximum demand." I can assure him that I have no desire to redefine "diversity factor."

I cannot regard his display of Home Office statistics as having any bearing on the tariff suggested by my article. There is no connection, surely, between the fourteen domestic fatalities of 1932 and the corresponding electricity supply tariffs. Personally, I should use the figure of fourteen to demonstrate the safety of electricity, and not the reverse, as Mr. Shackleton would appear to do.

I should also like to point out that lampholders are not mentioned in my article, and that the advocacy of a full and proper use of electricity does not imply encouragement of bad workmanship. J. L. FERNS.

Heywood, Lancs, *September 16th.*

Supervision of Installation Work

Almost everyone I have met who is connected with electrical installation work is alarmed that it is fast becoming a sweated industry and that prices are being cut lower every year. This condition is not to the good of anyone, least of all to electrical contractors and their employés.

Such a state of things could be cured to a large extent if supply authorities passed work only when it was done by or under the supervision of a qualified electrical engineer. I suggest that the qualification should take the form of passing the A.M.I.E.E. or similar examination. This would ensure both the technical and practical knowledge required to put up an efficient and safe installation and improve the standing of the electrical contracting industry.

I should like to hear the views of others interested in this matter. STUD. INST. C.E.

September 19th.

Better Salesmanship Needed

On many occasions during my parliamentary career I have naturally been brought into contact with important matters concerning the welfare of the great electrical industry. The Central Electricity Board was a subject that occupied the attention of the House for a considerable period. The passage of the Bill—one of the most important in recent years—gave one an opportunity to study all the arguments advanced by both its supporters and opponents.

It is a matter of history that the supply industry has been criticised for inefficiency in the matter of selling its service, and I have no hesitation in stating that a large number of undertakings have shown considerable apathy in business development and a certain lack of responsibility to the consumer. With the exception of a small proportion of the undertakings, the standard of salesmanship in the industry compares unfavourably with that to be found in other important commercial concerns.

There is no doubt whatever that the success of the Grid scheme will be considerably hampered because of the fact that its contact with the consumer is through the medium of the supply undertakings. These undertakings are admirably organised so far as their engineering departments are concerned, but are unable to carry out intensive development owing to what appears to be lamentable ignorance of the elementary principles of scientific salesmanship.

I am given to understand that electrical manufacturers complain that their trade is adversely affected by the policy of static obscurantism on the part of the supply authorities. As a detached, but keenly interested observer, I feel on safe ground in stating that the manufacturers supply a highly skilled sales organisation which is greatly nullified by the lack of interest in selling shown by the undertakings to whom they supply electrical apparatus.

Now that campaign funds are to be provided it is not unreasonable to hope for a well-organised national publicity campaign on the part of E.D.A. Unfortunately there will still be lacking a vital factor, namely, personal salesmanship to the consumer. It is difficult to comprehend why this should be

the case. Is it because the industry is controlled by its engineers and that salesmanship is considered a relatively unimportant factor? Possibly the leaders of the industry consider it undignified to appear in the market-place or, maybe, they have such implicit faith in their product that they do not consider it necessary to reiterate its manifold advantages of which they think the public should be aware.

Several instances can be cited of the vast consumption that

An emergency pumping plant installed within ten working hours by Mather & Platt, Ltd. (See note on page 402.)

can be achieved when an undertaking invokes the aid of the modern methods of scientific salesmanship. I was given the opportunity of reading a most interesting paper by Mr. J. N. Waite, of the Hull Corporation. In the course of his remarks he states that after thirty-six years' operation a bold sales policy was adopted with the result that during the last four years a 63 per cent. increase in the number of units sold has been registered. It is also of great interest to note that the number of employés during the period has increased from 235 to 708. I submit that this is indicative of the improvement which could be effected by half the undertakings in the country if the responsible authorities realised the value of modern methods of salesmanship.

Colonel Crompton supports this view with the statement that his forty-five years' experience of the distribution of electricity has led him to the conclusion that "the increase in demand we are hoping for is more a job for the commercial traveller than for the engineer. The demand must be controlled by people who study the requirements of the consumer and meet them by providing them with the hire of apparatus and assisted wiring, and similar help. In this connection, carefully-thought-out showrooms in which apparatus for heating, cooking and other domestic apparatus can be shown by properly qualified assistants are an enormous advantage."

Is the solution to the industry's problem to be found in the suggestion made by Brig.-General Legge in the columns of your well-known REVIEW, to wit, that an Electrical Sales Development Association should be formed? It would certainly appear to be a desirable preliminary either as an integral part of E.D.A. or as a separate organisation supported by the supply undertakings and the Central Electricity Board. To bring this Sales Association into being a little goodwill, plus experience, and a certain amount of organising ability are the simple ingredients needed. I have every confidence that the industry will find no difficulty whatever in producing these necessary qualities. HARRY BRITTAIN.

Westminster, S.W.1, *September 18th.*

To Works Managers and Others

From personal experience and other reliable sources of information, I have discovered that this is not a time for raising salaries. It is very hard to go on working without any hope of bettering one's position, but a lot of encouragement could be given at no expense to the management. The management could let one know that they felt that he was working for low wages, but that they appreciated his work and would pay him more as soon as times improved.

But until this Utopian time arrives, many small changes might be made to improve the conditions of working. I would suggest that men working on a salary basis should be spared the humiliation of "clocking on"; time-keeping could easily be maintained by the heads of departments.

The works hooter should be suppressed; there is no need for the whole district to know when the works starts—a quieter horn could be used inside the works. Also time off should be much more plentiful.

My whole plea is that as firms cannot pay their employés enough, then they should give them something in return for their work in the way of greater freedom and increased confidence. ANONYMOUS.

September 18th.

The Heating of Lampholders

On reading Mr. Mortimer Hawkins's letter in your issue of September 15th, I made it my business to inspect a number of fittings which were installed some two years ago. Owing to a concrete floor and condensation, the holders of these fittings were of the Crabtree bakelite-skirted push-bar type, each holder having to support a 12in. Benjamin reflector, with a 100- and 150-W lamp alternately.

I find that, after two years' use at an average of 8½ hours per day, these holders, apart from the usual discoloration of metal parts, are in very good condition; the synthetic material was not even brittle. H. P. FOUNTAIN,

Chief Electrical Engineer,

London, S.E.23, *September 16th.* Swan and Edgar, Ltd.

Mr. Hawkins's experience with bakelite lampholders is unfortunately a common one. The whole trouble is that those people who have the making up of specifications usually suffer from "bakelitism" and everything is specified "bakelite." As a practical electrician I can say we have had more trouble than ever since its introduction, especially in lampholders, switches, and as connectors on domestic apparatus, than ever we had with porcelain. The craze for calling everything shock-proof has done a great deal of harm and made it harder to convince users of electricity that there is little or nothing for them to be afraid of.

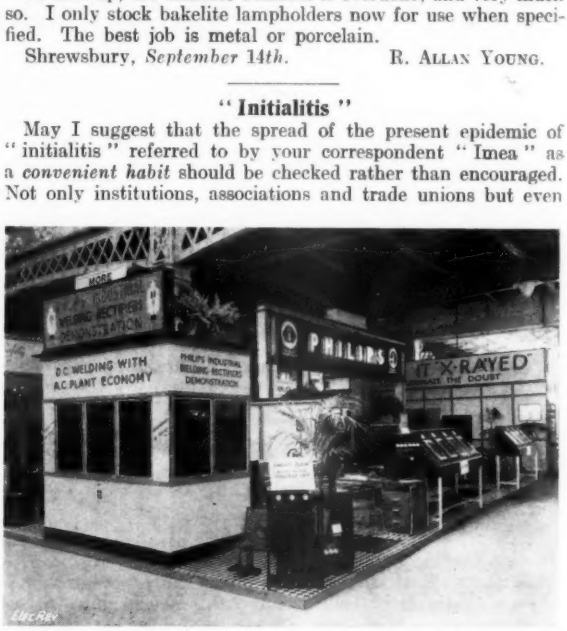
I would suggest that those architects and others who specify bakelite lampholders should be given the job of taking the shades off a month or two after they have been put up, even if there are only 60-W gasfilled lamps, let alone 100-W or 150-W.

To sum up, the bakelite business is overdone, and very much so. I only stock bakelite lampholders now for use when specified. The best job is metal or porcelain.

Shrewsbury, *September 14th.* R. ALLAN YOUNG.

"Initialitis"

May I suggest that the spread of the present epidemic of "initialitis" referred to by your correspondent "Imea" as a *convenient habit* should be checked rather than encouraged. Not only institutions, associations and trade unions but even



The Philips stand at the Shipping and Engineering Exhibition, Olympia, where regular demonstrations of electric welding are being given

commercial concerns are increasingly using as designations the initial letters of their often ponderous titles. To the list already given might be added:—Eca, Cma, Spck, Spca, Cws, Ilp, Drgm, Nbg, Ok, &c.: all of them convenient *and* musical.

Could not some other method of abbreviation be adopted or alternatively a suitable glossary be published?

ERNEST LOTHBURY.

Metric Units of Volume

The Chemical Divisional Council of the British Standards Institution has decided that in all British Standard Specifications prepared for use in the chemical industry in which reference to metric units of volume is made, the unit to be employed shall be the millilitre (abbreviation ml) in preference to cubic centimetres.

New Apparatus and Devices

for Domestic, Cooking and Heating, Lighting, Power and Scientific Purposes

Siemens "Xcel" Fires

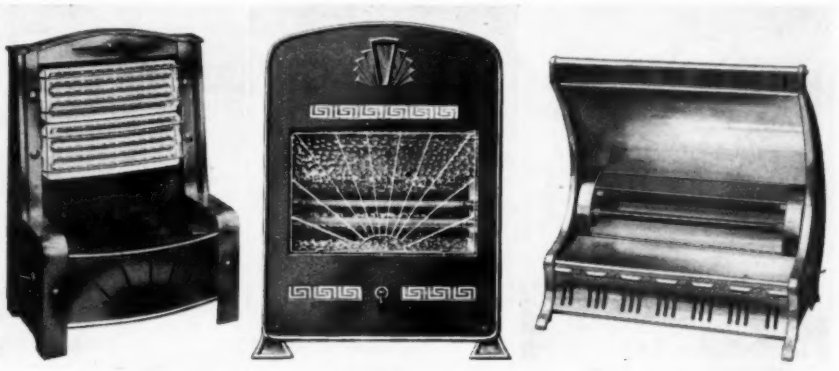
Among the new season's fires introduced by SIEMENS ELECTRIC LAMPS & SUPPLIES, LTD., 38-39, Upper Thames Street, E.C.4, are two "Cosyglos," 1 and 2 kW, with the "fuel" on the bottom front projections below the elements.

The larger model measures 18 in. by 13 in. by 8 in. and costs £3 in sprayed oxidised silver or copper. Nos. H7324 and H7330 are very similar, each having a one-piece casting with the modern easy-cleaning surface and a front projecting base. Both measure 15¼ in. by 13 in. by 5¾ in., the former having two 1-kW bars completely filling the aperture and the latter having some ornamental filling above and below the central bar. The 1-kW model costs 18s.

The H7327 fire is of light box construction and has cast end pieces with corner ornamentations which can serve as legs with the fire horizontal or vertical. It is finished in bronze and measures 10½ in. by 12¼ in. by 5¾ in. With a 1-kW loading it costs 17s. 6d. At 18s. 6d. there is a 1,500-W "fan shaped" model, No. H7342, finished in blue or buff enamel.

A 2-kW panel fire, 22 in. by 17 in. by 5¾ in. incorporates rod-type elements focused in a hammered chromium-plated reflector. The frame is of stainless steel, and the price is £3 15s. Another reflector fire is of the curved back-reflector type with cast end pieces. It is chromium plated, loaded at 2 kW, measures 17 in. by 16 in. by 9¼ in., and is priced £2 12s. 6d. A bowl fire, 600 W or 750 W with a 9-in. bowl, has its angled pedestal finished in coloured enamel and costs 15s.

For warming motor-car engines there is a heater with perforated cylindrical housing and a hook for vertical suspension. Finished in brown enamel and complete with 9 ft. of flexible cable and a b.c. adaptor it costs 10s.

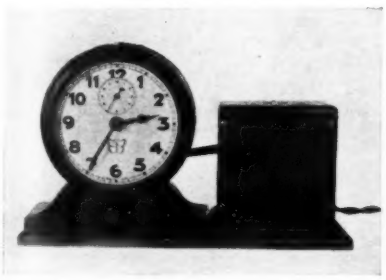


Some recently introduced "Xcel" fires—the H7334, H7338 and H7329

A Shop-window Time Switch

The S.F.P. ELECTRICAL CO., North Bar Works, Banbury, Oxon, has recently introduced a low-priced time switch of robust construction for shop-window use.

The switch itself is of the mercury type rated at 10 A, the timekeeper comprising an ordinary alarm clock. The only connecting element to the switch unit is a lever which rests on the alarm winding handle of the clock; at a predetermined time the lever falls and operates the switch. The device can be made to switch "on" instead of "off" by simply reversing the mercury tube in its holder, and if desired two switches can be used in series—one to switch "on" and the other "off." The switch alone costs 12s. 6d., or with clock 18s. 6d.



A low-priced time switch

Continuous-line Lighting

The "Mazda Rodo" tubular lamp recently introduced by the BRITISH THOMSON-HOUSTON CO., LTD., Rugby, has its filament mounting so arranged that the tube is lighted throughout its entire length, the special connecting caps being fitted on the side of the tube instead of at the ends. Thus by placing any number of lamps end to end a continuous line of light can be produced to form, for instance, geometrical patterns or the outline shape of a wall or structural feature on which the lamps are mounted.

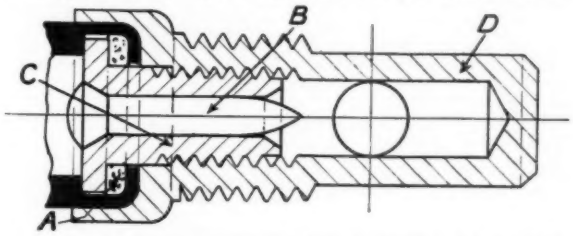
A "Mazda Rodo" lamp

In straight and curved types, 40-W and 60-W lamps are available 30 mm. in diameter and 500 mm. long. A 40-W straight lamp costs 17s. 6d., and a 60-W curved lamp 33s. 6d. Straight lamps with terminals at the side and 252 mm. long are sold at 5s. 9d. (30 W) and 6s. 6d. (60 W). Special vulcanite single-contact holders for these lamps, with a ball clip at the side, are available at 5s. each.

Fire Prevention

The "Sparkheyl" capsule has been devised to prevent fires and explosions in confined spaces, such as cable joint boxes in street manholes and fuse boxes on consumers' premises, due to short-circuit or the vaporising of insulating compounds. It consists of a steel bulb in which liquid CO_2 is compressed to 1,000 lb. per sq. in., the quantity being calculated as 15 per cent. of the cubic capacity of the space to be protected. The gas is released by the melting of a fusible closure in the bulb.

In special cases, *e.g.*, the protection of pits containing inflammable materials, release may be obtained by the melting of the seal by the heat from an electrically controlled heating element operated from the 230-V supply circuit; it is claimed that the time taken to act is less than 15 seconds. The system can also be applied to ordinary fire appliances. Type F.A. is designed for use on cable mains; this has a gas capacity of 0.018 cu. ft. and a total weight of 18.5 gm., and costs 1½d. per bulb.



A cross-section of the top of a "Sparkheyl" capsule showing: (A) Rubber washer; (B) fusible alloy rivet; (C) brass element; (D) brass guard

The capsules are obtainable from SPARKLETS, LTD., Upper Edmonton, N.18. The electric discharge element has been constructed by Mr. Weese, of the Erie Resistor Co., Ltd., under the supervision of the inventor, Mr. G. E. Heyl.

Improved Thermostatic Switch

The DRAYTON REGULATOR & INSTRUMENT CO., LTD., West Drayton, Middlesex, has revised the "Drayton EVST" thermostatic switch. The overall dimensions of the base have been considerably reduced, the mechanism has been modified to reduce friction to a minimum, and the porcelain terminal block has been made accessible without removal of the main cover.

Models are available for operating at temperatures up to 900 deg. C. The contacts are housed in a neat metal case which can be sealed. Temperature setting is key operated, the set temperature being approximately indicated by a pointer moving over a marked scale seen through a mica window in the cover.

The new "Drayton EVST" thermostatic switch

A push fit button over the temperature adjusting stem serves to maintain the switch housing dust-tight and improves the external appearance.

A New "Efesca" Vacuum Cleaner

The "Efesca Minor" vacuum cleaner

We illustrate herewith a new product of MESSRS. FALK, STADELMANN & Co., LTD., 83/93, Farringdon Road, E.C.1.

The "Efesca Minor" vacuum cleaner, which costs 6 gns. (complete with a set of cleaning, sweeping and dusting appliances and a disinfecting pad) has a powerful, silent-running, ball-bearing motor, and is attractively finished in maroon leatherette. The machine carries a twelve months' guarantee.

A Reflector Lamp

A lighting unit for drawing offices, bench work, &c., recently introduced by the ALL BRITISH I.D.L. ELECTRIC LAMP Co., Devon House, 173/175, Great Portland Street, W.1, consists of a lamp specially shaped to give the maximum downward illumination, and a silvered reflector which hugs the top part of the glass bulb.

The reflector is separate from the lamp, so that it can be used again when the lamp is renewed. In 60-W and 100-W sizes (100-120 V and 200-260 V) the lamp costs 1s. 9d. and 2s. 6d., and corresponding reflectors cost 1s. 3d. and 1s. 6d.

The "I.D.L." reflector lamp for downward illumination

New Lighting Trades Products

Some interesting features are presented in the new season's products of LIGHTING TRADES, LTD., 51, Garratt Lane, Wandsworth, S.W.18.

An extensive range of electric fires varying in price from a few shillings upwards is included in the well-known series of "Redot" electric fires, in which a new type of imitation coal fire (No. E.79351) has been introduced. This fire, which is of attractive design, has dimensions of 22 in. in height by 4 in. deep by 15 in. wide, with a loading of 2 kW, and is fitted with two lamps to obtain an illuminated flicker effect. Two switches control the elements, and the fire is supplied complete with lamps, flicker and flex in either sprayed oxidised copper or silver at 60s.

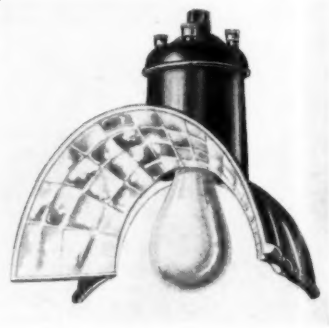
The new "Redot" fire

In the electrical fittings section a considerable number of up-to-date designs have been added to the lists recently, including many unique types of tubular and panel styles.

New Street Lighting Unit

Greatly improved lighting distribution is claimed by the REVO ELECTRIC Co., LTD., Britannia Works, Tividale, Tipton, Staffs, for its new "Magnalite" street lighting unit. The chief feature of the fitting is that it projects a beam of light covering a rectangular area, instead of having a conical emission.

The unit is of substantial construction, comprising cast-iron shells into which are fitted specially designed one-piece faceted silvered mirrors. It is suitable for lamps up to 200 W and shockproof lampholders are included with it.



The "Magnalite" street lighting fitting

The silvered mirror being moulded in one piece ensures that there are no exposed edges over the reflecting surface liable to depreciation, whilst the absence of gaps in the continuity of the mirror surface greatly increases the collection zone, the mirror backs being protected by a heavy coating of copper and a special compound affording complete protection to the silvering. The mirrors are embedded in cement and secured in correct position by iron retaining bars preventing any possibility of the glass coming adrift from the cast-iron shell. The makers say that the direction of the reflected rays by this one-piece mirror is definitely much more accurately determined than by other methods.

Ease of wiring has been provided for by a new patent device, and the unit can be readily adjusted to ensure correct lamp focusing. Prices range from 33s. 6d. for the two-way model to 47s. 6d. for the four-way type.

A Small Floodlighting Projector

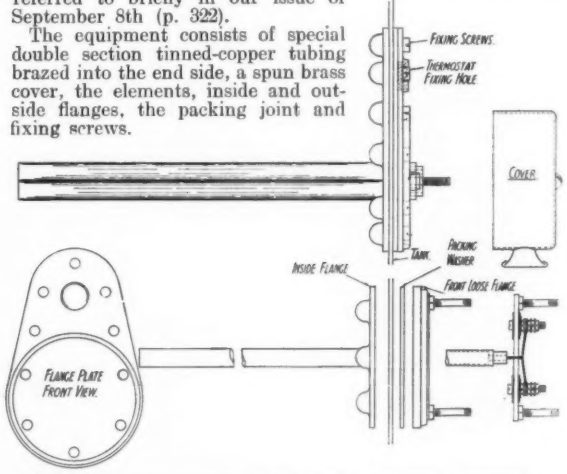
The "Brilamp" floodlighting projector recently introduced by BRICE ELECTRICAL, LTD., Cliffdown Works, 41 to 44, Castle Hill Road, Hastings, is designed for use with lamps up to 1,000 W, and is sturdily constructed of silver finished steel for easy adjustment to any angle or position.

The reflector is heavily chromium plated, while the interior is finished with baked white stove enamel. The glass is held firmly in position by a special interchangeable frame and holder, and the unit is well ventilated although waterproof. The cost of the projector is £2 10s.

Manor Immersion Heaters

The illustration below depicts clearly the method of construction of the new range of immersion heaters which are now being marketed by the MANOR ELECTRIC OVEN & FIRE Co., 7, Sutton Street, Charing Cross Road, W.1, and which were referred to briefly in our issue of September 8th (p. 322).

The equipment consists of special double section tinned-copper tubing brazed into the end side, a spun brass cover, the elements, inside and outside flanges, the packing joint and fixing screws.



Method of construction of the new "Manor" immersion heater

A feature of the apparatus is that the elements are withdrawable without breaking the water joint, and provision has been made for fixing a thermostat on the same flange. No fixing bolts or screws project through into the water compartment thus rendering water leakage along the fixing screws impossible.

The prices of the 1-, 2-, and 3-kW sizes are 26s., 35s., and 45s. respectively.

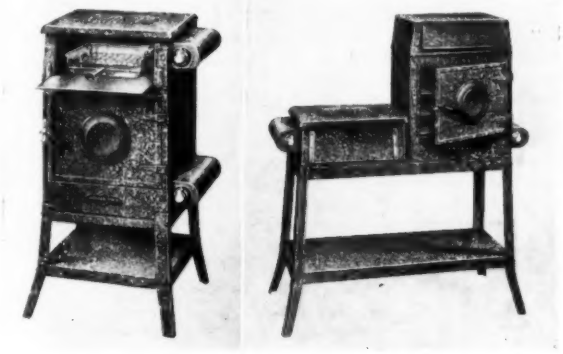
New Domestic Cookers

MESSRS. C. HOUNSLOW & Co., 96a, Coleridge Street, Hove, who have manufactured sheet-metal ovens for gas and oil firing for some twenty years, have now turned their attention to the production of domestic electric cookers, and have placed three models on the market designed to meet the requirements of families of different sizes.

Model "B.C.1" is a breakfast cooker incorporating the Metropolitan-Vickers radiant type boiler-griller element with a loading of 1,600 W. The body is constructed of high-grade

sheet-steel, and is finished in grey mottled stoved enamel. The top is of cast-iron and is vitreous enamelled. A three-heat switch is fitted, and the cooker is complete with a grill, pan and grid, as well as an aluminium reflecting plate for use when either boiling or grilling is undertaken separately.

Model "E.101" is a complete unit suitable for four to five persons, and it incorporates the "B.C.1" breakfast cooker as the hob and grill chamber portion. The oven cooking space is 12 in. by 13 in. by 10 in., and with the exception of the cast-iron top it is made entirely of sheet-metal, being finished in grey mottled stoved enamel. The oven is well lagged and the interior is made of galvanised iron. Detachable runners and shelves afford easy access for cleaning, and it is not necessary to dismantle the oven to renew the elements. The oven stands at a suitable height to obviate stooping, and the two grids and a browning plate can be adjusted to any desired height. Below the oven is a large shelf to hold cooking utensils.

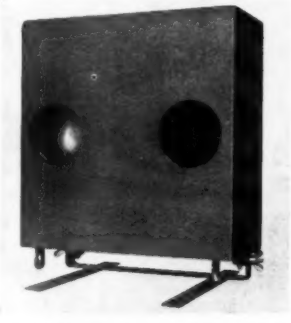


The Hounslow "E.101" and "E.103" cookers

Model "E.103" is a combination of the "B.C.1" and "E.101" cookers, mounted side by side on a rigid stand. The total loading is 3,200 W (boiler-griller 1,600 W and oven 1,600 W). A very useful addition to this model, however, is a hot chamber over the oven. A special feature of these ovens is the excellent heat insulation, allowing for a high temperature to be obtained in minimum time.

For Animating Advertising Signs

In the "Sinterae" vibrating lighting unit introduced by SINTERAE ILLUMINATING CO., 7, Princes Street, Westminster, S.W.1, two gasfilled lamps are alternatively exposed at a certain frequency through different aperatures, with the result that the angle at which the light strikes its objective is constantly changing, and with it the shadow cast by an object in relief. On a reflective surface a sparkle effect is obtained. In any case the result is a peculiar optical illusion of animation very arresting to the eye.

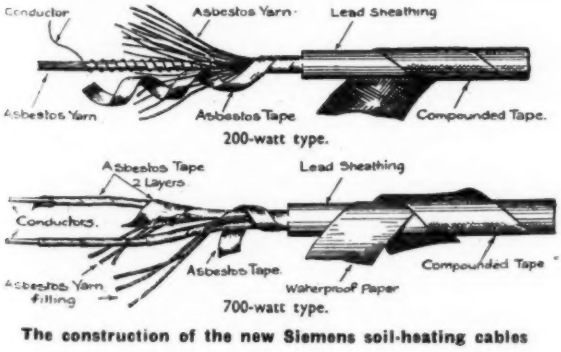


A "Sinterae" vibrating lighting unit

The lamp exposures are made by a motor-driven revolving shutter. No. 1 "Sinterae" accommodates two 150-W lamps, measures 12 in. by 12 in. by 5½ in., is finished in French grey and costs £9 10s.

Soil-heating Cables

For warming the soil in greenhouses, garden frames, etc., MESSRS. SIEMENS BROTHERS & CO., LTD., of Woolwich, S.E.18, have introduced soil-heating cables, with loading of 200-W (10 yd.) or 700 W (50 yd.) of which modifications are available



The construction of the new Siemens soil-heating cables

to suit customers' requirements. The accompanying illustration shows the construction of each type.

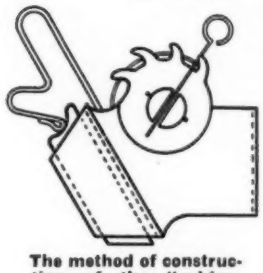
Water Heater and Wash Boiler Control Board

An ironclad water heater and wash boiler control board recently introduced by SANTON, LTD., Somerton Works, Newport, Mon., has a malleable-iron base and a pressed-steel case housing either a 10-15-A or a 25-A d.p. single-heat switch, or a 10-15-A or a 25-A d.p. series-parallel switch, together with a b.c. lampholder for a neon pilot lamp.

The "Santon" ironclad water-heater and wash-boiler control board

There is provision on the base of the board for earthing, and the cover can be taken off only by first removing the switch handle. The unit is of robust construction and pleasing appearance (cream, brown or black cellulose finish), measures 6in. long, 3¼ in. wide, and 2¾ in. projection, and has a ¾-in. screwed conduit entry hole and a bushed hole for a c.t.s. outlet. A model with a 10-15-A d.p. single-heat switch costs 11s. 6d.

An Improved Brush Holder



The method of construction of the "whine-free" brush holder

With the object of eliminating "brush whine" in connection with the commutator motors of "silent running" lift motors, &c., the SYNTHETIC CARBON & ENGINEERING CO., LTD., Colindale Avenue, N.W.9, has evolved a modified type of reaction brush holder which ensures absolutely stable running of the brushes in both directions of rotation.

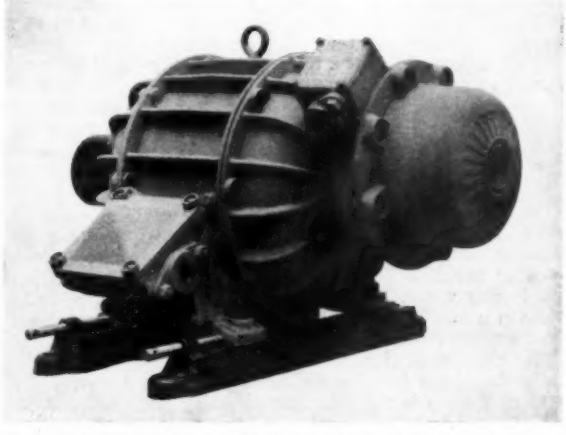
The parts have all the simplicity of the normal brush holder and brush, and there are no complicated extensions, clips, or caps to work loose on the brush. This brush gear can also be recommended for use where there are short but severe overloads or vibration.

An Explosion-proof Motor

The accompanying illustration depicts one of the latest flame- and explosion-proof squirrel cage and slip-ring motors introduced by BROOK MOTORS, LTD., Empress Works, Huddersfield.

These motors are made in sizes of from one to thirty h.p., single-, two- and three-phase, and the actual model illustrated (10-h.p., 400 V, 3-phase) has just been awarded the Buxton mines test certificate No. 172, which provides for working in petroleum vapour as well as methane.

They are constructed of cast-iron, sturdily ribbed, and have trifurcating boxes and armoured cable glands fitted as



A Brook 10-h.p. slip-ring flame- and explosion-proof motor

standard. The stator terminals have a separate sealing chamber, and the rotor box is made for filling with compound.

New Tucker Switchplugs

MESSRS. J. H. TUCKER & CO., LTD., Kings Road, Tyseley, Birmingham, announce the introduction of 5- and 15-A three-pin "Spartan" switchplugs and also a combination 15/5-A "Spartan" switch controlling a two-pin outlet with angle entry socket tubes, allowing the simultaneous use of two accessories. It is also available with the 5-A outlet not controlled by the switch.

D

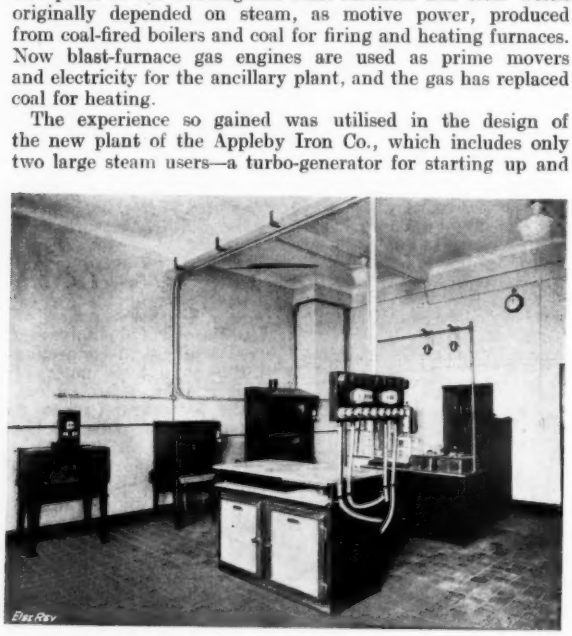
Some Metallurgical Problems

The Autumn Meeting of the Iron and Steel Institute

SEVERAL of the papers read at the Autumn Meeting of the Iron and Steel Institute (which was held at Sheffield and Scunthorpe from September 13th to 16th) contained points of direct or indirect interest to electrical engineers.

One of the most important was that on "The Utilisation of Blast-furnace Gas," by W. B. Baxter. In Lincolnshire large quantities of gas are produced in proportion to the pig-iron made, owing to the low-grade quality of the ores. The plant of the Frodingham blast furnaces and steel works originally depended on steam, as motive power, produced from coal-fired boilers and coal for firing and heating furnaces. Now blast-furnace gas engines are used as prime movers and electricity for the ancillary plant, and the gas has replaced coal for heating.

The experience so gained was utilised in the design of the new plant of the Appleby Iron Co., which includes only two large steam users—a turbo-generator for starting up and



The staff kitchen at Battersea power station

balancing purposes and steam-hydraulic slab shears taking steam from waste-heat boilers. The furnaces are blown by reciprocating blowers driven by gas engines. All other machinery is driven by electricity generated by gas-engine sets. The furnaces are heated by blast-furnace gas, except those of the open-hearth type, which will eventually be fired with mixed coke-oven and blast-furnace gas.

The power house contains six gas engines and one steam unit. A recent addition is a 3,600-kW, 94-r.p.m. gas engine driving a 6.6-kV, 50-cycle, 3-phase alternator. The engine is of the four-stroke horizontal, tandem, double-acting type, and is fitted with a supercharger and scavenger. Part of the sensible heat of the waste gases is utilised in a waste-heat boiler with a capacity of 13,500 lb. of steam per hr. at 170 lb. per sq. in. superheated to 350 deg. C. This boiler has a heating surface of 2,476 sq. ft., a preheater surface of 1,238 sq. ft., and a superheater surface of 215 sq. ft. The engine cylinder diameter is 1,500 mm., the stroke 1,500 mm. A one-hour test at 3,640 kW gave an overall mechanical efficiency of 83.8 per cent. Heat consumption per i.h.p. was 7,820 B.th.u.

"Waste" Heat Usefully Employed

The heat balance showed that 65.1 per cent. of the heat was usefully employed—27.4 per cent. in power generation and 37.7 per cent. in steam production. Heat losses were allocated in the following percentages: Friction and electrical, 5.2; cooling water, 15.8; waste gas, 13.0; engine, 0.4; boiler, 0.5. On a two-hour test at 2,406 kW the overall mechanical efficiency was 82.4 per cent.

The coke required per ton of iron is 27.65 cwt., and the gas produced per ton of coke is 153,000 cu. ft. About 67 per cent. of the gas is cleaned. The total dry gas (at 0 deg. C. and 760 mm. hg.) produced per week is about 658 million cu. ft. Of this 144 million is used for blowing and power production and 70 million is "unaccounted for," i.e., produced at week-ends and cannot at present be utilised; of the remainder 169 million cu. ft. is used for steam raising—77 million at the ironworks and 92 million at the Frodingham steel works for rolling mills—and 275 million for heating processes at both works.

Blast furnace gas is no longer looked upon as a waste product but as an essential factor in the working economy of a combined plant. The paper includes seven appendices showing how the gas is conserved for efficient use at Appleby and Frodingham. The tests were made to show what was happening under present-day practice in order to detect where improvements in working might be achieved.

An investigation into the question of whether the addition of beryllium to certain types of steel used in aero-engine construction is worth while was described in a paper by J. H. S. Dickensen and W. H. Hatfield. The results were negative; the use of beryllium with nickel and nickel-chrome steel makes them apt to "burst" when forging, more fragile under impact test, and more liable to corrosion. The objective of the investigation was limited, and the authors suggest that some of the facts disclosed are deserving of further investigation.

The Conduction of Heat

"The Thermal Conductivity of Iron and Steel" was the subject of a paper by J. W. Donaldson, who has formed conclusions regarding wrought iron and steels but has experienced difficulty in obtaining definite results with malleable and other cast irons owing to the factors introduced by the formation of free carbon. The thermal conductivity of wrought iron is 0.175 cal. per cm. per sec. at 100 deg. C., and decreases with increasing temperature. The thermal conductivity of steel decreases with the carbon content. 0.16 cal. per cm. per sec. being obtained from a 0.10 per cent. carbon steel and 0.117 from a 1.09 per cent. carbon steel. The influence of silicon is to lower the thermal conductivity of all iron alloys, especially cast iron, and of phosphorus to decrease that of grey cast iron.

Experiments on nitrogen-hardened cast iron were described by J. E. Hurst, who found that for stationary i.c. engines, after a mileage of 30,000, resistance to wear of nitrogen-hardened cast iron compared with centrifugally cast iron had a ratio of 2 to 1 and compared with chromium-alloy cast iron 2.6 to 1, which was retained at 40,000 miles. Tests under road conditions gave a ratio for the chromium alloy of 2.2 to 1. These results demonstrate the improved resistance to wear and the stability of cast iron surface-hardened by the nitrogen process.

Among the conclusions drawn by Dr. N. P. Inglis and W. Andrews as to the effects of hydrogen at high pressures and temperatures were that at high pressures (200 to 250 atm.) hydrogen will attack steel at much lower temperatures, that the limiting temperature giving rise to attacks on mild steel may vary between 50 and 100 deg. C., and that a large, thick-walled vessel may be attacked at temperatures as low as 200 deg. C., but that with the common alloy steels the limiting temperature at 250 atm. is between 300 and 350 deg. C. The addition of chromium progressively improves resistance to hydrogen; chromium-nickel austenitic steels are not disintegrated by hydrogen at 250 atm. and 450 deg., but absorb large quantities of the gas and suffer severe embrittlement.

Electrolytic Slag Extractor

R. Treje and Prof. C. Benedicks, of the Metallurgical Institute of Stockholm, claim to have worked out a rational method for the electrolytic extraction of slag from iron and carbon steel, the residue being uncontaminated by iron hydroxide or basic iron salts. Electrolysis is performed in a vessel divided in two by a diaphragm. The iron specimen—surrounded by a collodion bag, carried by a floating wooden ring, for collecting the slag—forms the anode in a bromide solution containing sodium citrate; the cathode consists of a copper plate in $CuSO_4$ solution.

This method prevents the formation both of oxygen at the anode, which would acidify the liquid in the collodion bag and cause it to attack the slag, and of hydrogen at the cathode, which would render the liquid there alkaline, resulting in precipitation of hydroxides and contamination of the slag. The liquid used attacks MnO even less than does distilled water. The slag residue is collected by centrifuging in a graduated tube. Detailed directions for the application of the method are given in the paper.

The pickling of carbon steels, both chemically and by using the test pieces as cathodes in dilute sulphuric acid with 0.5 A per specimen, was discussed by I. G. Slater. Rapid temporary embrittlement, especially with heavy-gauge hard-drawn wire, ensues immediately upon immersion, increasing with acid concentration and temperature. Deterioration is less rapid when an inhibitor is added, a mixture of flour paste and stannous chloride solution being particularly effective; the damage to steel wires may be permanent under certain conditions; recovery takes place usually on exposure to higher temperatures. When examined by an impact-hardening test all samples were found to be softer before exposure.

New Books

Electrical Transformer Theory, by S. GORDON MONK. Pp. viii+140; figs. 71. London: Sir Isaac Pitman & Sons, Ltd. Price: 5s. net.

This unpretentious little book by the Head of the Electrical Engineering Department of Plymouth and Devonport Technical College is "intended to give a concise exposition of the theory of operation of transformers," and it is unusual, chiefly on account of the practical nature of the treatment. In a matter of eleven chapters, the author deals with fundamental principles, the single-phase transformer, the testing of transformers, transformers in parallel, transformer cooling, three-phase circuits, simple three-phase transformers, three-phase interstar windings, Scott-connected transformers, auto-transformers, and six-phase and twelve-phase transformers. The chapters on three-phase circuits and transformers and on auto-transformers are particularly good, and the treatment is assisted considerably by the liberal inclusion of winding and vector diagrams which make perfectly clear the effects introduced by changing the direction of coil winding, internal meshings between phase windings, and connections of terminals to external busbars.

To all intents and purposes the book is non-mathematical, and the author's assumption of the reader's familiarity with the j operator need not cause any dismay to the most casual of students. This is a book which should be in the personal library of every student and engineer as its worth is far in excess of the modest sum at which it is issued.

Practical Electricity, by TERRELL CROFT. Pp. xiv+674; figs. 558. London: McGraw Hill Publishing Co. Price: 18s. net.

This is the third edition of a work which was published originally in 1923 by one of America's most prolific writers on engineering subjects, and it is probably much better known on that side of the Atlantic. The present edition includes a new section on vacuum tubes, the section on matter and the electron theory has been revised, and the work generally has been modernised.

Broadly speaking, the book deals with the fundamentals of electricity and magnetism, a.c. and d.c. machines, cells and batteries, transformers, a.c. systems, and vacuum tubes, but, for all its 674 pages, the text seems strangely inadequate for the present-day needs of serious students. The trouble probably is that the author has endeavoured to cover too wide a field in the compass of a single volume, and, while such a catholic treatment may have had some justification originally, engineering progress since that time has been so rapid and far-reaching that the general type of text-book is being superseded by specialist works.

Within its limits, however, the text is written with a simple clarity which is commendable and the book is redeemed from mediocrity by the appositeness of the illustrations. The book, no doubt, will have some value to the elementary student, and the illustrations should provide a source of inspiration to teachers in the elementary grades of learning.

Voltage Regulation by "Sliding" Transformers ("Gleittransformatoren"), by DR. ING. O. LÖBL and N. HAMMERL. Pp. 22; figs. 40. Berlin: Julius Springer. Price 2 RM.

Voltage regulation of a.c. networks is one of the principal problems confronting supply engineers at present. The appearance of this booklet therefore is opportune. It deals, briefly, with general regulation requirements and with the defects of methods of regulation involving the use of tapping switches. Thereafter it describes the "sliding" transformer, its theory, construction and application, and, finally, examples of "sliding" transformers which have been used in practice; voltage records showing the effect of introducing a "sliding" transformer into a 400-V line are reproduced. This type of transformer is novel and merits the attention of all transformer engineers. The printing and figures are on the usual high standard of the publishers.

Works Management Education, by T. H. BURNHAM. Pp. xi+91. London: Sir Isaac Pitman & Sons, Ltd. Price: 7s. 6d.

Although the pioneer work of the Manchester College of Technology cannot be ignored, it is only during the last three or four years that any substantial progress has been made in this country towards the establishment of facilities for education in the technique of management. Over twenty technical institutes in Great Britain have, however, now established classes in industrial administration, and there is a strong leaning towards the adoption of the case system. This system aims at cultivating the right attitude of mind through the consideration and discussion of management problems actually encountered in practice—so selected that, in reaching a decision as to the right executive action to be followed in the particular circumstances, the essential principles of management will be inculcated.

This book offers an encouraging indication of the extent to which industrial firms are now prepared to co-operate with the educational authorities in providing and expounding these "typical" management situations. The book outlines the curriculum followed at the South-East London Technical College in its production management course. Full details are given of thirty-six cases used for discussion to cover the fundamental principles of factory management, together with a syllabus of the associated lecture course in business organisation.

In a foreword Mr. E. S. Byng, managing director of Standard Telephones & Cables, Ltd., deals broadly with the subject of educational training for management. The book should be of considerable interest to professors and students of other institutes running management courses. No attempt is made, however, to reproduce the solutions adopted for each case problem nor to outline the arguments leading to their selection.

Il Proiezionista di Film Sonori (The Sound-film Projector), by ENRICO COSTA. Pp. 442; figs. 242. Milan: Ulrico Hoepli. Price: 20 lire (approx. 6s. 6d.).

This book is a comprehensive survey of the theory and practice of talking film equipment. The descriptions are lucid and the author is painstaking to the minutest detail, but everything described would be familiar to any technician in this country. It can well be understood that Italy is backward in sound film technique, as the commercial field for films in the Italian language is limited, but with the standardisation of the various talking film systems the necessity for a better understanding has been realised. It is particularly interesting to note the author's wide range; there is as much care taken in the description of the working of a telephone jack as there is in the theory of the decibel.

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Shorter Notices

"The Law Relating to Electrical Energy in India," by J. W. Meares, C.I.E. (Fourth edition.) Pp. xix+425. London: W. Thacker & Co. Price: 24s.

"The Unemployed Man," by E. Wight Bakke, Ph.D. 308 pp. London: Nisbet & Co., Ltd. Price: 10s. 6d. net.—This most human book is the result of the American author's stay in the midst of the population of industrial Greenwich. The study reveals far more of the real nature of unemployment and its effects and the operation of the insurance system than many columns of statistics.

British Overseas Electrical Trade in August

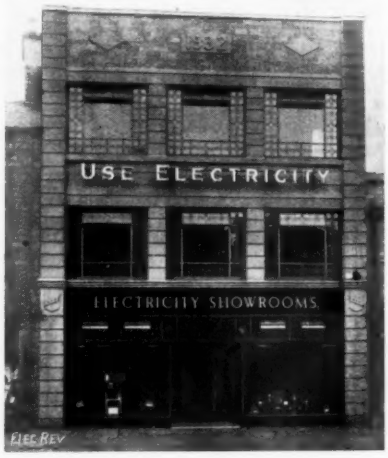
	Exports.			Imports.			Re-Exports.		
	Electrical exports for Aug., 1933.	Inc. or dec. as compared with July, 1933.	Inc. or dec. as compared with Aug., 1932.	Electrical imports for Aug., 1933.	Inc. or dec. as compared with July, 1933.	Inc. or dec. as compared with Aug., 1932.	Electrical re-exports for Aug., 1933.	Inc. or dec. as compared with July, 1933.	Inc. or dec. as compared with Aug., 1932.
Insulated wires and cables ...	£108,767	+ £3,336	+ £24,574	£23,663	+ £5,618	+ £6,823	£176	– £342	– £111
Electric carbons	1,959	– 158	+ 1,163	15,640	+ 5,304	+ 7,069	25	+ 10	+ 8
Arc lamps and searchlights ...	172	+ 47	– 406	231	+ 231	+ 231	30	– 40	+ 30
Incandescent lamps	32,902	– 844	+ 3,863	16,949	– 4,556	+ 4,832	650	– 167	+ 58
Other lighting apparatus ...	24,491	+ 666	+ 807	27,757	+ 7,737	+ 3,527	2,167	– 1,341	+ 1,348
Batteries and accumulators ...	49,822	– 8,673	+ 1,419	1,295	+ 436	– 4,483	3,589	+ 3,515	+ 3,377
Meters and instruments ...	22,699	– 838	+ 3,261	24,342	+ 2,426	+ 779	274	– 677	– 48
Unenumerated electrical goods and apparatus ...	77,940	– 4,941	+ 4,943	38,774	+ 6,597	– 8,892	2,705	+ 78	+ 184
Telegraph and Telephone Cable and Material—									
Telegraph and telephone wires and cables (not submarine)	44,275	+ 26,071	+ 26,983	184	+ 14	– 715	—	—	– 72
Submarine telegraph and telephone cables...	14,563	+ 14,038	– 3,325	—	—	—	—	—	—
Telegraph and telephone apparatus	166,086	+ 35,354	+ 42,087	86,403	+ 35,096	– 16,975	1,382	– 61	+ 425
Electrical Machinery—									
Railway and tramway motors	50	– 910	– 5,105	—	—	—	—	—	—
Other motors and generators	71,536	– 53,589	+ 9,255	—	—	—	—	—	—
Unenumerated electrical machinery	81,702	– 25,196	– 118,378	20,056	+ 6,000	– 16,738	1,569	– 4,798	– 2,994
Total	£699,964	– £15,637	– £8,859	£255,294	+ £64,903	– £24,542	£12,567	– £3,823	+ £2,205
Decrease for the first eight months of the year ...	Exports. £335,078			Imports. £346,189			Re-Exports. £47,229		

Business and Industrial Notes

The Week's Electrical Trade News from all Sources. Commercial and Industrial Developments, Business Changes, Market Prices for Materials, Trade Openings, New Publicity Literature, Liquidations, and Failures

New Rawtenstall Showrooms

Ald. J. Hamer, Mayor of Rawtenstall, opened new electricity showrooms in the town on September 12th. The showrooms, which have been erected at a cost of £4,000, are three storeys high, the first two floors being utilised as showrooms with the top floor fitted up for demonstrations. Coun. R. Ashworth, chairman of the Electricity Committee, said the Department had more than justified its existence. There were just over 8,000 houses in the borough, 4,500 of which were connected to the mains. These showrooms, which are situated in the main street, take the place of the original showrooms which are to be demolished.



The new Rawtenstall showrooms

The showroom turnover since the first showrooms were opened six years ago has gone up from £2,000 to over £6,000, and the domestic sales for the corresponding period have increased from 400,000 kWh to over one million kWh.

Powers of the Victorian Electricity Commission

In introducing the Bill to prevent the Victorian Electricity Commission from selling electrical appliances in competition with private traders, Mr. Macfarlan, Minister in Charge of Electrical Undertakings, said that the other powers and duties of the Commission would not be interfered with. The Commission would be able to continue to establish depôts and showrooms to encourage the use of electrical apparatus, and it could repair or recondition any appliance which had been sold before the proposed Act came into force. The Commission claimed that it had always patronised and fostered Australian articles, the inference being that other traders had not done so. The fact was, said Mr. Macfarlan, that the Commission had patronised a small coterie of Australian manufacturers and had neglected others. When the present Bill became law a Bill would be introduced which would constitute the Commission as the general supervising electrical authority in the State. It would be given power to issue licences for the sale of appliances and apparatus, to control their quality and ensure their safety.

Stretford Charter Celebrations

On September 16th the urban district of Stretford became a municipal borough. The district of Stretford includes in its boundaries the industrial area of Trafford Park, where the Metropolitan-Vickers Electrical Co., Ltd. (then the British Westinghouse Co.) was one of the first to establish works more than thirty years ago. The company was represented at the Charter Day celebrations by Mr. G. E. Bailey (director), who at the luncheon in the new Town Hall presented a piece of silver plate to the borough. A procession formed a feature of the celebrations, and the illustration accompanying this note shows a decorated van advertising "Cosmos" lamps, which took part.

A "Cosmos" van in the Stretford celebrations

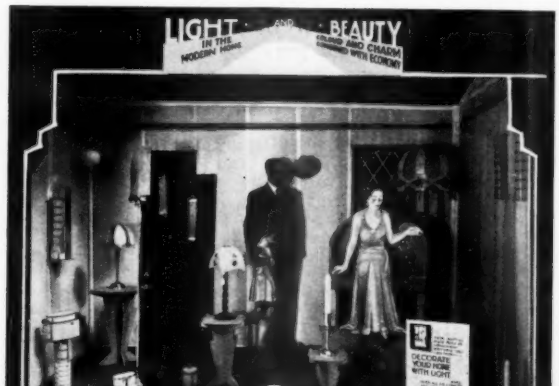
Local Exhibition

The Torquay Town Council is holding an electrical exhibition at the Town Hall from October 30th to November 4th, and electrical contractors are invited to participate.

E.D.A.'s New Activities

The new E.D.A. Council came into office yesterday. One of the last things to be carried out under the old Council was the launching of a new quarterly official magazine, *Electrical Housekeeping*. We have a specimen copy before us and feel that we ought to congratulate E.D.A. on a very meritorious attempt to place the case for electricity before the householder. Written largely by women no doubt and edited by a woman, Miss M. Gwynne Howell, it should have a cordial welcome in many a domestic circle. Electricity supply undertakings have given support to the tune of one hundred thousand copies, at little more than a penny per copy, and these will find their way into the hands of consumers, actual and potential. Anything which helps to get the truth home to the popular mind should bring grist to the electrical mill.

"Light—where you want it" is the keynote of the window display for electrical traders illustrated in the October programme of the Association, which is designed to appeal to home lovers. Three new posters for the month are illustrated, while attention is drawn to two display signs for delivery vans, which have been prepared from E.D.A. posters specially for use on the roofs of delivery vans. These signs can also be used for showroom and window displays. The usual price list of seasonal literature is included.



The E.D.A. October window display

Electrical Machinery Exports in July

A large reduction in purchases by European countries and British India is principally responsible for a decline in the value of electrical machinery exports by over 42 per cent. during August, as compared with the corresponding month last year. The destination of shipments is analysed below:—

	Quantities.		Values.	
	Aug., 1933. Tons.	Inc. or dec. as compared with Aug., 1932. Tons.	Aug., 1933. £	Inc. or dec. as compared with Aug., 1932. £
European countries	67	−447	18,412	− 59,647
Japan	9	+ 9	1,519	+ 1,262
South America	32	− 18	7,802	− 1,882
South and South-West Africa	294	+ 54	38,854	+ 5,605
British India	173	−455	25,491	− 61,100
Australia	65	− 5	10,950	− 3,447
New Zealand	55	+ 19	8,333	+ 2,617
Canada	21	− 45	2,693	− 5,377
Other countries	327	+101	42,234	+ 7,681
Total	1,043	−787	£156,288	−£114,228

Our usual monthly table relating to electrical imports and exports generally appears on page 393.

"Superite" Cables

Messrs. W. T. Henley's Telegraph Works Co. claim that "Superite" cables, which have formed the subject of their "mystery" campaign in this journal during the past few weeks and will do so for several weeks yet, represents a

definite advance in electric cable manufacture. This week readers are informed that these cables and wires have been produced expressly to withstand the penetration of moisture and the attack of rust. In addition to their resistance to the action of sea air, they are claimed to be particularly well suited for situations where excessive humidity, high temperature, and liability to chemical or acid fumes exist. Another merit is their ability to withstand excessive condensation in steel tubing installations, a condition of things which is met with in modern buildings of concrete construction. In a folder just issued by the company as part of its publicity campaign, particulars are given of the laboratory tests to which the new product was subjected; it also contains details of the construction of the cables.

The Business Efficiency Exhibition

The Business Efficiency Exhibition will be opened on September 26th at the White City by Lord Melchett. The space booked this year shows an increase of 40 per cent. over that taken for last year's exhibition.

An Advertisement Correction

Messrs. J. H. Tucker & Co., Ltd., ask us to state that an error crept into their last week's advertisement in the ELECTRICAL REVIEW. The diameter of the body of their "Titan" lampholder should have been given as "under 1 3/32 in." (not 1¼ in. as stated), enabling shades with the minimum British Standard holes to be accommodated.

International Combustion Shares

We are informed that the shares held by International Combustion Engineering Corporation, of New York, in International Combustion, Ltd., of Aldwych House, London, have been acquired by English interests. No shares are now held in the U.S.A.

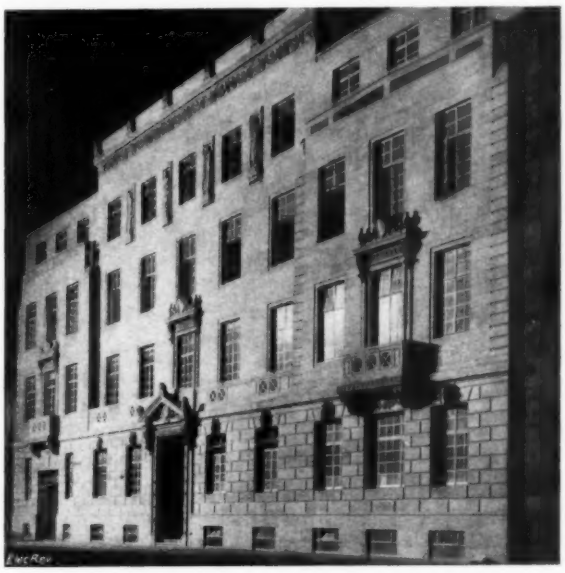
The Brighton-Bristol Week

The varied uses of electricity, largely from the industrial aspect, are emphasised at the Bristol Industries Exhibition which was opened at Brighton on September 13th in connection with the "Brighton-Bristol Alliance." The British Vacuum Cleaner & Engineering Co., Ltd., showed models of its "Goblin" vacuum cleaners, and the Brighton and Preston Relay Station, Ltd., had an attractive stand, a feature of which was an automatic flashing illuminated map to illustrate the sources of its relay programmes. The Brighton Lighting and Electrical Engineering Co., Ltd., and Messrs. Allen West & Co., Ltd., in conjunction with the Brighton Corporation, had the largest stands in the exhibition, and showed apparatus mainly for industrial or public service purposes. The former concern exhibited illuminated street island pillars, traffic signals, fuse boxes, sealing chambers, and a large range of street lighting fittings. Messrs. Allen West & Co., Ltd., displayed time switches, a complete duplicate bus-bar oil-immersed circuit breaker, h.p. fuses, examples of the "Bailey" boiler apparatus, and a 132,000-V fuse.

The special electrical illuminations in the town are a feature of the Alliance. The street lighting standards along the front and the Aquarium are brightly festooned. The hotels are decorated, and the flagstaff of the Brighton Cruising Club is illuminated. In the gardens on Grand Parade approximately 12,000 yd. of wiring have been used, and there are about 20,000 lamps in the trees. The Royal Pavilion provides the greatest attraction. A fairy garden has been created there. Illuminated columns supplied by the Brighton Lighting and Electrical Co. are sufficient in themselves to provide enough light, but, as will be seen from the illustration on page 399, all round are neon tube representations of cats, dogs, birds, &c., while floodlighting completes the scheme. Messrs. Allen West & Co. have supplied all the neon lighting effects, and the coloured lighting is by Holophane, Ltd.

New Municipal Buildings at Preston

The adaptability of Siemens "Sieray" hot cathode lamps for floodlighting purposes has been very successfully demonstrated by their use during the period September 11th-16th at the opening of the new municipal buildings at Preston. Both faces of the building were floodlighted to an intensity in the neighbourhood of 5 foot candles by the use of eight 400-W "Sieray" lamps on each face. The full effect of the installation is apparent from the accompanying illustration. The lamps are



"Sieray" floodlighting at the Preston municipal buildings

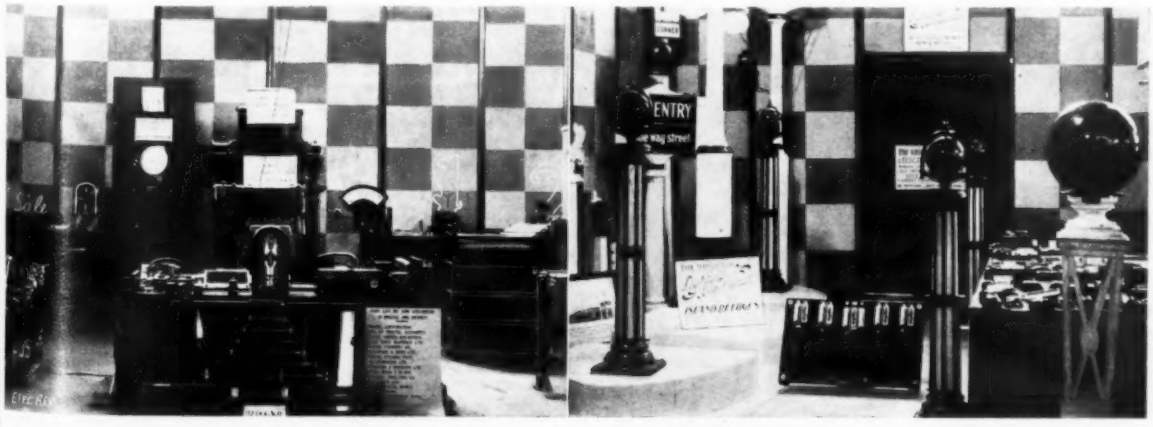
fitted in Siemens A.S.150 asymmetric floodlight fittings, which are mounted on the roofs of the buildings opposite to the new municipal offices. The fittings are designed to direct the light downwards on to the face of the building, and are so arranged as to prevent any dazzle effect on passing traffic.

Employment During August

The *Ministry of Labour Gazette* states that during August employment in the engineering industry showed a further slight improvement in most sections, but was still bad on the whole. The total out of work was 215,235, a decrease of 3,518 as compared with the preceding month, the percentage falling from 22.4 to 22. There was little change in electrical engineering, and employment in that section remained moderate; the number of unemployed fell from 13,008 to 12,886, and the percentage from 13.8 to 13.7. In the electric cable, wire and lamp-manufacturing group there was a considerable improvement, those out of work numbering 13,844 (11.8 per cent.), as compared with 15,843 (13.5 per cent.) in July, while a decrease from 5,204 to 4,784 (from 20.8 to 19.1 per cent.) was recorded in the electrical wiring and contracting industry.

A Franco-German Radio Agreement

It is announced from Paris that an agreement was reached on September 7th which regulates the relations between the French and German makers of radio apparatus and settles the matters in dispute, including that of patent rights, hitherto existing between the Verband der Funkindustrie (or the Telefunken Gesellschaft), which incorporates the German makers of receiving sets, and the principal French producers on the other—the Compagnie Française Thomson-Houston and the Compagnie Générale de Télégraphie sans Fil. Under the agreement, by which the German interests expressly recognise the patent rights of the French firms, the French parties have granted to the Germans an import quota of 40,000 receiving sets per annum, and this number will be increased if the demand of the French market should grow. The German Verband, which is said to have paid a certain sum in settlement



The stands of Messrs. Allen West and Co., Ltd., and the Brighton Lighting and Electrical Co., at the Brighton Exhibition

of all claims made in respect of previous deliveries of receiving sets, will establish an office in Paris which, in conjunction with the French companies, will supervise development in the French market. The agreement was brought into force as from September 1st, and a certain amount will be paid by the Verband for every delivery to France since that date. Among other matters, the agreement provides for the organisation of the French market, but it is not known whether definite price-fixing arrangements are included.

Social Events

The employés of the Beckenham Urban District Council electricity undertaking held their annual outing recently, the venue being Southend-on-Sea. The journey was made by coach, Mr. J. E. Tapper, the electrical engineer, accompanying the party. The chairman of the Council and the vice-chairman of the Electricity Committee joined the gathering at lunch, and an enjoyable day was spent in ideal weather. The party, which totalled over sixty, is seen in the accompanying illustration, Mr. Tapper being the second from the right.

The half-yearly golf match of the Scottish Electrical Manufacturers' and Factors' Association was held at Glenbervie on September 12th. The principal prize-winners were:—First, Mr. J. A. Fraser (Carron Company); second, Mr. W. A. B. Ames (British Electrical and Manufacturing Co.); third, Mr. T. S. McFarlane (India Tyre and Rubber Co.), and fourth, Mr. A. W. Kilpatrick (Central Electric Co.).

The generation and mains departments combined to play the rest of the Lancashire Electric Power Co.'s organisation at cricket, tennis and bowls at Walkden on September 16th. The games took place at the sports ground of the Walkden Moor Methodist Club. Although there have been isolated inter-departmental contests previously, this was the first occasion upon which all departments had joined together and organised a sports meeting of this character. Mr. C. D. Taite, engineer and manager, and other members of the executive were present. The teams and their supporters travelled by special buses from Manchester and Whitefield. At cricket and bowls the generation and mains staffs were too strong for the opposing teams, but at tennis the "Rest" held their own, a draw being the result.

Prices of Materials

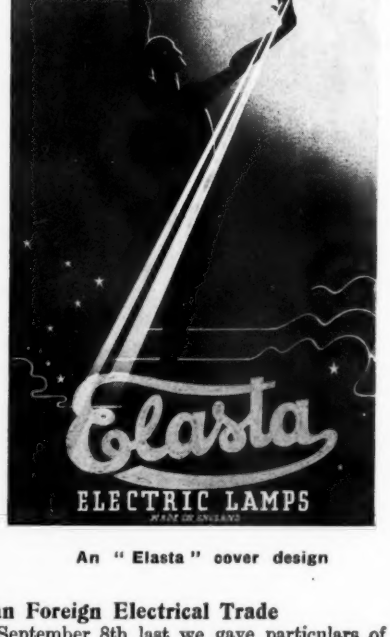
Messrs. F. Smith & Co. report September 20th: Electrolytic copper bars and sheet, no change. Electrolytic copper wire rods, £46 10s., 10s. decrease. Ditto h.c. wire, 7 7/16d., 1/16d. decrease. Silicium bronze wire, 8 2/16d., 1/16d. decrease.

Messrs. Edward Till & Co. report, September 20th: India-rubber, Para fine, 4½d., ¼d. decrease.

Messrs. James & Shakespeare report, September 20th: No change in the price of copper bars (best selected), sheet and rod, and English pig lead.

An "Elasta" Lamp Campaign

Pope's Electric Lamp Co., Ltd., is again conducting an intensive lighting campaign. In addition to the usual general lamp catalogue, the company is issuing to the trade several attractive folders for dealers and users, and a priced showcard for shop or window display. Our illustration shows an "Elasta" figure in a striking setting which is being used as the cover design for these folders. The company has augmented its distribution organisation by opening new branches at Norwich and Bournemouth.



An "Elasta" cover design

Belgian Foreign Electrical Trade

In our issue of September 8th last we gave particulars of Belgian foreign electrical trade during the first half of this year, and mentioned that there were serious discrepancies in the figures for the imports and exports of telegraph and telephone instruments as printed in the 1932 and 1933 Belgian official returns. The Customs Division of the Belgian Ministry of Finance now informs us that the 1932 figures as printed in the 1933 half-yearly return are incorrect. The imports of this apparatus were valued at £374,965 in January-June, 1932, and £332,992 in January-June, 1933. The corresponding telegraph and telephone apparatus figures for the exports were £283,992 and £183,000. The alteration necessitates a correction in the 1932 half-year's total of Belgian electrical imports and exports, the former, instead of £1,269,698, amounting to £1,537,213 while the export total is £732,832 and not £577,048.

Beckenham electricity employés at Southend

E.R.A.'s New Address

The British Electrical and Allied Industries Research Association is removing to 15, Savoy Street, W.C., on September 28th. The telephone numbers will be Temple Bar 7907.

For Sale

The Dearne District Light Railways Joint Committee invites tenders for the purchase of sub-station machinery.

The Stoke Newington Electricity Department has for disposal a feeder-booster set.

The West Cumbrian Power Co., Ltd., has for disposal internal combustion engines and plant.

(See our classified advertisements.)

Trade Announcements

The Manor Electric Oven & Fire Co. is removing on September 29th to 175, Windsor House, Victoria Street, S.W.1. (Telephone: Victoria 0782.)

The Border Electrical Service has removed to larger premises at 8 and 10, Bridge Street, Berwick-on-Tweed.

Messrs. S. O. Powker, Ltd., have opened an office and stores at 2, Sussex Street, Deansgate, Manchester (telephone: Deansgate 2921). Their resident representative is Mr. W. Rigby.

Messrs. Dempster Moore & Co. (Machinery), Ltd., Glasgow, distributors for Messrs. S. Wolf & Co., Ltd., have moved to 272, St. Vincent Street, Glasgow.

The address of Messrs. Hawnt & Co., electrical and wireless factors, is now 59, Moor Street, Birmingham, 4.

The Foster Engineering Co., Ltd., is opening this month a new branch at 46, West Register Street, Edinburgh.

The Keighley Gear Co., a subsidiary of Messrs. David Brown & Sons (Huddersfield), Ltd., has transferred its entire plant and personnel to Prospect Works, Lockwood, Huddersfield.

New Catalogues and Lists

Wardle Engineering Co., Ltd., Old Trafford, Manchester.—A 132-page catalogue (L.21) of industrial and commercial lighting fittings.

Wm. Sanders & Co., Falcon Electrical Works, Wednesbury.—A wall sheet illustrating and describing the complete range of the company's switchgear. Also leaflets dealing with the "Sandalite" combined switch and fuses.

Venner Time Switches, Ltd., Kingston By-pass Road, New Malden, Surrey.—Illustrated leaflets giving particulars of recent products—the "Rebater," the "Cost-i-Meter," and a master frequency control clock.

Edison Swan Electrical Co., Ltd., 155, Charing Cross Road, W.C.2.—Publication No. C.L.924, giving full particulars of the company's "X-ray" reflectors.

Foster Engineering Co., Ltd., Apex Works, South Wimbledon, S.W.19.—A leaflet describing screened-type air-break switchgear for pole mounting.

Thos. Alnutt & Co., Essex Works, Lee, Chapel Lane, Langdon Hills, Essex.—A price list of washers, pressed nuts, earthing clips and soldering tags.

Igranic Electric Co., Ltd., 149, Queen Victoria Street, E.C.4.—Publication No. 6805 dealing with push-button starters for small squirrel-cage motors.

Thos. Firth & John Brown, Ltd., Atlas and Norfolk Works, Sheffield.—An eighty-four page catalogue, copiously illustrated, giving particulars of steels specially resistant to corrosion.

Long & Crawford, Ltd., 2, Gorton Road, West Gorton, Manchester.—Catalogue sheets Nos. J.733 and K.833 giving details, respectively, of e.h.p. automatic fusible cut-outs and e.h.p. rotary oil switch fuses.

Sturge & Baker, Ltd., Premier Works, Sheepcote Street, Birmingham.—Leaflets describing the "Vesper" electric fire screens and the "Hot Air" electric bed warmer.

W. T. Henley's Telegraph Works Co., Ltd., Holborn Viaduct, E.C.1.—An illustrated folder dealing with "Superite" moisture and rust resisting cables.

Simplex Electric Co., Ltd., 159, Great Charles Street, Birmingham.—Catalogues Nos. H.C.1405 and F.P.1406 giving full particulars of the 1933-34 season's electric fires.

Siemens Electric Lamps & Supplies, Ltd., 38 and 39, Upper Thames Street, E.C.4.—Lists Nos. 530, 531, 532 and 533 relating to Siemens domestic and automobile lamps.

Ruston & Hornsby, Ltd., Lincoln.—A well-produced catalogue dealing with the present range of Ruston oil engines for marine auxiliary duty. The engines described are from 35 h.p. to 800 h.p., and the illustrations include ships in which the company's auxiliaries are installed.

Hart Foundry Co., Ryland Street, Birmingham.—An illustrated booklet giving brief particulars of the company's various designs of electric fires.

Belling & Lee, Ltd., Cambridge Arterial Road, Enfield, Mddx.—Booklets giving details of radio connectors, fuses and fuseholders, and pickups.

Greene, Phillips & Co., 45, Berners Street, W.—A catalogue illustrating the "P.H." convector system of warming buildings.

Ferranti, Ltd., Hollinwood, Lancs.—A booklet illustrating the company's range of radiant fires, priced.

British Thomson-Houston Co., Ltd., Crown House, Aldwych, W.C.2.—A number of booklets and pamphlets illustrating in colour the wide range of Mazda lamps.

Schall & Son, Ltd., 75, New Cavendish Street, W.—Bulletin No. 1,019, containing illustrated particulars of X-ray couches.

Brush Electrical Engineering Co., Ltd., Falcon Works, Loughborough.—A well-produced brochure (List No. 2011), dealing with Brush transformers.

L. Wilkinson, 8, City Road, E.C.—An illustrated catalogue of "Wilco" motors, dynamos, lighting accessories, &c.

A simple yet telling method used in a recent carnival procession by Chesterfield Electricity Department to advertise the "Revo" electric cookers it lets out on hire

Electric Depôt, Ltd., Pritchett Street, Aston, Birmingham.—Illustrated leaflets giving brief particulars of E.D.L. adjustable lighting brackets for workshops and offices.

Bankruptcy Proceedings

G. Wiseman, radio dealer, 317 and 322, Walworth Road, London, S.E.—The statutory first meeting of creditors was held last week at Bankruptcy Buildings, W.C., Mr. V. Armstrong, Assistant Official Receiver, presiding. The receiving order was made on August 31st on the petition of the Electric Lamp Service Co., Ltd., which alleged as the act of bankruptcy the non-compliance of the debtor with the requirements of a statutory bankruptcy notice. The debtor attributes his insolvency to liabilities incurred on behalf of a company with which he was connected and which went into voluntary liquidation. He estimates his liabilities at £1,000, including a guarantee of £500, and says that he has no assets. As a result of the meeting, which was closed, the affairs of the debtor remained in the hands of the Official Receiver.

P. Kalis (trading as Ludgate Circus Radio), wireless dealer, Ludgate House, Ludgate Circus, London, E.C.—The statutory first meeting of creditors was held last week at Bankruptcy Buildings, W.C., Mr. Bruce Park, Assistant Official Receiver, presiding. The receiving order was made on August 30th on the petition of Edward Reading, trading as the Radio Trading Co., Old Street, City, stated to be creditors for £350. It appeared that Philip Kalis had attended under the proceedings and has stated that he was formerly Philip Kalisky, taking his present name by deed poll some three or four years ago. He began business in December, 1930, with a capital of £1,000 borrowed from his wife, to whom £400 or £500 is still due. A private meeting of his creditors was recently held, but no concrete proposal was submitted to them. He attributes his insolvency to bad trade, heavy overhead expenses, drastic price-cutting which caused keen competition, and lack of working capital. The debtor estimates his liabilities at £1,200, due to thirty creditors, and values his assets at £344, of which £250 is represented by stock. It appeared that the Court had, however, already made an order for summary administration. A resolution for bankruptcy was now passed, and it was decided to leave the estate in the hands of the Official Receiver.

Leonard Harold Potter, wireless retailer (trading as "The Norwich Radio Co., 13 and 15, St. Giles Street, Norwich).—This debtor applied for his discharge recently, at the Shirehall,

In connection with their new "Callboy" synchronous electric alarm, Messrs. Smith's English Clocks, Ltd., have prepared this attractive show-stand coloured in green, black, and orange

Norwich, when the statement of affairs showed liabilities of £377, but proofs for £418 had been admitted. The assets were estimated at £245, but they had actually realised £386. A dividend of 11s. 11½d. in the £ had been paid. The Judge granted an immediate discharge.

E. S. N. Rees, wireless dealer, 4, High Street, Llanhilleth.—First and final dividend of 3s. 9d. in the £, payable September 28th at 34, Park Place, Cardiff.

J. H. Withycombe, electrical engineer and wireless dealer, 61, High Street, Barnstaple.—Trustee, Mr. W. P. Hatton, Queen Anne's Chambers, Barnstaple, appointed September 7th.

J. A. Henderson, electrical contractor, 28A, Basinghall Street, E.C.—Trustee, Mr. D. C. Evans, 44, Gresham Street, E.C.; released May 12th.

H. L. McIvor, electrical engineer, 92, High Street, Ewell.—Last day for receiving proofs for dividend, September 26th. Trustee, Mr. C. R. Waterer, 29, Russell Square, W.C., Official Receiver.

H. B. Hydes (Western Radio), 71, Allerton Road, Liverpool.—Last day for receiving proofs for dividend, September 27th. Trustee, Mr. J. Allcorn, Government Buildings, Victoria Street, Liverpool.

J. C. Willey, wireless engineer, 12, Fernhill Road, Cowley, and 47 & 49, Cowley Road, Oxford.—First meeting September 26th at 8, Farbury, Reading. Public examination October 23rd at the County Hall, Oxford.

V. F. Maddox, electrical and wireless engineer, 6, Homend Street, Ledbury.—First and final dividend of 3¾d. in the £, payable September 26th at 133, St. Owen Street, Hereford.

Private Arrangements

L. A. O'Brien and **F. Hulme** (trading as O'Brien and Hulme), wholesale electrical and wireless supplies, 78, George Street, Manchester.—The creditors were called together recently, when a statement of affairs was submitted which showed liabilities of £19,637. After allowing £165 for preferential claims, the net assets were £2,907, leaving a deficiency of £16,730. It was stated that the business was commenced about forty years ago, and the surviving partner (Mr. F. Hulme) became part owner in 1920. Following the death of Mr. O'Brien, the remaining partner consulted his accountant and a conference of the largest creditors was called. The firm had an agreement with E.L.M.A. which included a clause providing for cancellation in the event of compounding with the creditors. Efforts therefore, were made to avoid the cancellation of the agreement, and a proposal was submitted of a composition of 5s. in the £ the idea being that the claims of the creditors should be purchased for that amount. The largest creditors approved the scheme, but the E.L.M.A. did not agree. The present position was attributed largely to the considerable depreciation of the stock, which in 1921 was over £30,000. In the last ten years bad debts amounting to more than £5,500 had been written off, whilst the bank interest and commission had amounted to £6,000. During the last five years the turnover had amounted to £185,000. After some discussion it was decided that a deed of assignment should be executed to Mr. J. H. Hulme, Manchester, and Mr. A. T. Eaves, of Messrs. Harry L. Price & Co., 47, Mosley Street, Manchester, as joint trustees, together with a committee consisting of the representatives of the General Electric Co., Ltd., Callender's Cable & Construction Co., Ltd., Corfield & Cripwell, Siemens Electric Lamps & Supplies, Ltd., and Mr. Parkin S. Booth. The principal creditors are:—British Insulated Cables, Ltd., £427; Benjamin Electric, Ltd., £127; British Thomson-Houston Co., Ltd., £323; Burroughs Electric Engineering Co., Ltd., £137; Callender's Cable & Construction Co., Ltd., £963; Credenda Conduits, Ltd., £150; A. C. Cossor & Co., Ltd., £102; Edison Swan Electric Co., Ltd., £271; Foster Engineering Co., Ltd., £518; General Electric Co., Ltd., £4,240; W. T. Henley's Telegraph Works Co., Ltd., £137; Mullard Wireless Service, Co., Ltd., £886; Philips Lamps, Ltd., £306; Siemens Electric Lamps & Supplies, Ltd., £781; Wholesale Fittings Co., Ltd., £111; Kendall Milne & Co., Ltd., £151.

Company Liquidations

Burovox (1931), Ltd.—Meeting October 17th at 4B, Frederick's Place, Old Jewry, E.C., to receive an account of the winding-up by the liquidator, Mr. S. H. Mearns.

Robert Walker (Factors), Ltd.—Particulars of claims by October 16th to the liquidator, Mr. T. Bell, 53, Grey Street, Newcastle-upon-Tyne.

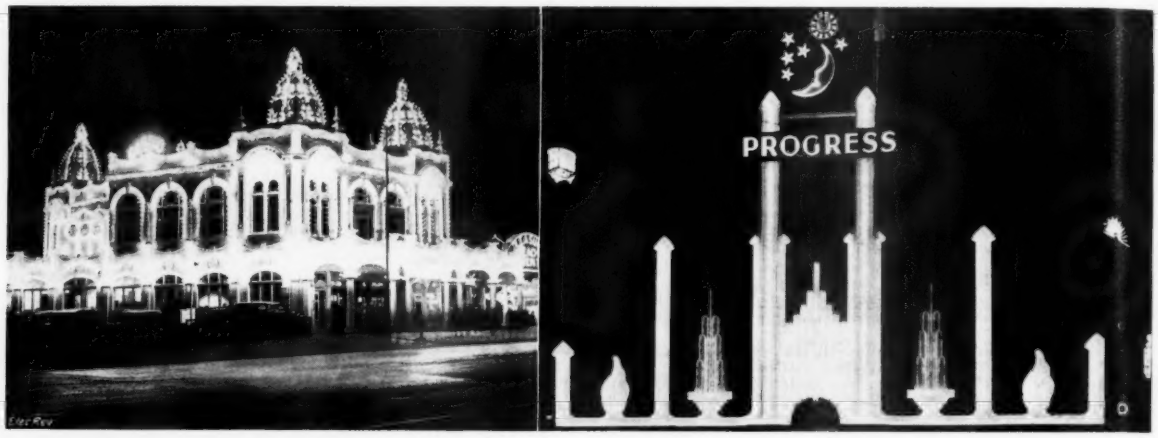
Electricity Supply

Lighting, Domestic, Power

Accrington.—REDUCED CHARGES.—The Electricity Committee has decided to make an all-round reduction in charges as from October 1st. The reduction amounts to about 10 per cent. on present charges, and will involve a loss in revenue of about £7,000 per annum.

Adwick-le-Street.—STREET LIGHTING.—The Council has had the whole of its area publicly lighted by electricity in place of gas, and the change was inaugurated on September 11th.

Bishop's Stortford.—PURCHASE OF UNDERTAKING.—The North Metropolitan Electric Power Supply Co. has informed the U.D.C. that, in connection with the transfer of the local electricity undertaking to the company, the special rights of the Council with regard to purchase will not be affected.



The Blackpool illuminations: An example of effective floodlighting and neon tube decoration by the G.E.C.

Boundstone.—OVERHEAD LINES.—The Farnham Gas & Electricity Co. is seeking permission to erect overhead lines at Boundstone.

Bridge of Allan.—OBJECTION TO OVERHEAD LINES.—The Town Council has refused the Scottish Midlands Electricity Supply, Ltd., permission to erect l.p. overhead lines in the Sunnylaw district.

Buckie.—TARIFF REDUCTIONS.—The Town Council has reduced the price of electricity for lighting from 7d. to 6d. per kWh, and is to give a discount of 12½ per cent. on the domestic two-part tariff. Electricity was introduced only two years ago, and the lighting rate then was 8d. per kWh. There are now 542 consumers.

Burnley.—OVERHEAD LINE.—The Electricity Committee proposes to erect an overhead line to supply electricity to premises in Briercliffe.

Dorchester.—MAINS EXTENSIONS.—The Electricity Committee is to extend mains at a cost of £566.

Dover.—CABLE EXTENSIONS.—The Town Council has decided to carry out cable extensions at an estimated cost of £2,200 in order to supply electricity to the contractors for the train ferry dock. As the Southern Railway Co. is to use electric power for the new dock, it is anticipated that it will agree to the terms entered into with the contractors. One of the Railway Co.'s conditions is that there shall be a duplicate main.

Dunstable.—ELECTRICITY FOR HOSPITAL.—The Joint Hospital Board has applied to the Luton Electricity Department for a supply of electricity to the hospital for lighting and heating, and the architect, Mr. Pickering, is to prepare the necessary specification for the installation.

Glasgow.—SUB-STATIONS.—The Clyde Valley Electrical Power Co. is to erect sub-stations in Crookston Road, Cardonald, and Queen Victoria Drive, Scotstounhill.

Great Yarmouth.—BULK SUPPLY CHARGES REDUCED.—The Town Council has reduced the charge for the bulk supply to Lowestoft from £3 10s. to £3 7s. 6d. per kVA.

Hampshire.—SPECIAL ORDER.—The Mid-Southern Utility Co. has applied to the Electricity Commissioners for a Special Order authorising it to extend its area of supply to include parts of the rural districts of Winchester, Basingstoke, and Hartley Wintney.

Halifax.—REDUCED CHARGES PROPOSED.—The Electricity Committee has approved recommendations of the borough electrical engineer (Mr. E. A. Mills) for a reduction in most of the charges for electricity equivalent to approximately £11,800 per year. The reduction is subject to the Town Council's approval.

Helensburgh.—LOAN.—The Town Council is to make application for permission to borrow £800 for mains and services and £200 for meters.

Heston and Isleworth.—MAINS EXTENSIONS.—The Electricity Committee is to extend mains to an estate off Wellington Road, Hounslow (£306), and in London Road (£487).

Irish Free State.—PROTEST AGAINST THE ELECTRICITY SUPPLY BOARD'S CHARGES.—At a conference of the Association of Municipal Authorities in Ireland, held at Waterford last week, a resolution was passed protesting against the continuance of the 25 per cent. impost on all consumers of Shannon Scheme current a few years ago by the Electricity Supply Board to make up a deficiency of the working of the Board, for which the public at large were not in any way responsible; the time had arrived when the charge should be taken off, and the Conference called upon the Supply Board to give effect to the terms of the resolution.

Kenilworth.—BURTON GREEN SUPPLIES.—The Highways Committee has approved revised proposals of the Midland Electric Light and Power Co., Ltd., for underground cable in connection with a supply of electricity to Burton Green.

Kirkcudbright.—ELECTRIC STREET LIGHTING.—Mrs. Milburn, wife of Provost Milburn, switched on the electric street lighting last Saturday.

Lanarkshire.—ELECTRICITY TO REPLACE GAS?—The Bellshill District Committee at its last meeting recommended that electric lighting be substituted for gas lighting on routes formerly traversed by the Lanarkshire tramways.

Lanchester.—L.P. EXTENSIONS.—The Rural District Council is to offer no objection to a proposal of the North Eastern Electric Supply Co., Ltd., to extend its l.p. system on the Knitsley housing scheme.

Largs (Ayrshire).—ILLUMINATION SCHEME.—The municipal illuminations scheme, carried out at a cost of £5,000, was officially inaugurated last Friday.

Lichfield.—LOANS.—The City Council has received sanction to a loan of £1,710 for extensions of the supply to Yoxall. A loan of £5,724 for a duplicate feeder has been applied for.

REVISED CHARGES.—A new scale of charges for combined heating and cooking in private houses, conditionally upon the consumer wiring for and installing electric heaters or cooking apparatus having a minimum capacity of 1 kW each, has been adopted, as follows: A fixed quarterly charge equal to 5 per cent. of the net rateable value for the first £30, plus 2½ per cent. over £30, and a running charge of 1d. per kWh for the first 500 kWh, ¾d. per kWh for the next 500, and ½d. per kWh beyond.

London.—ISLINGTON.—In sending us a copy of the accounts of the electricity undertaking, Mr. A. P. MacAlister, the borough electrical engineer, draws attention to the satisfactory financial result which has been achieved when reviewed in conjunction with the low tariff charges for electricity, the net surplus being £45,942, a decrease of only £636 as compared with the preceding year, although the increase in interest charges exceeded £6,000. The electrical energy sold increased by approximately 1¼ million kWh, the total being 39,306,297 kWh, despite the fact that three consumers who accounted for over one million kWh have left the district. The general increase in consumers is maintained at about 3,000 per annum, while the net connections during the year increased by over 4,000 kW. A contribution of £11,007 has been made to the rates, and expenditure of £20,000 on mains has been met out of the surplus. It is intended to expend a further £20,000 for a similar purpose during the next twelve months, in addition to the usual annual capital expenditure of £12,000 on short length extension of mains and services.

Lunesdale.—A SUPPLY SOON.—The Rural District Council has been informed by Lancaster Corporation that the Electricity Department is going forward with a scheme for supplying electricity in the area.

Manchester.—LIGHT-SENSITIVE CELLS FOR STREET LIGHTING.—Reference is made in the annual report of the Corporation Highways Department to the use of light-sensitive cells for the control of electric circuits used in connection with street lighting. Mr. J. B. L. Meek, the city engineer, states that the use of these units will not be extended until a more stable performance is obtained.

Mansfield.—NEW SUB-STATION.—The Electricity Committee is to provide a sub-station on the Oxclose Estate (£410).

Minehead.—PROMENADE ILLUMINATION.—It was reported at a recent meeting of the Urban District Council that the district auditors were prepared to approve expenditure upon a scheme of decorative lighting for the promenade.

Norton-Radstock.—STREET LIGHTING.—The Lighting Committee has placed a contract with the North Somerset Electric Supply Co., Ltd., for the lighting of Clandown, Writhlington, and Haydon for seven years.

Norwich.—YEAR'S DEVELOPMENT.—The Electricity Committee reports a net profit for the year of £25,252, as against £24,159 the previous year. During the year the record number of 4,587 new consumers were connected, making the total now supplied 39,170. The net increase for the year in the number of cookers and water heaters was 1,053 and 440 respectively, and the total at the end of the year was 6,125 and 1,822 respectively.

LOANS.—The Corporation is applying for sanction to loans for unspecified mains and services (£100,000) and transformers (£25,000).

Paignton.—SUB-STATION.—The Paignton Electric Light & Power Co., Ltd., is to erect a sub-station in Well Street.

Penrith.—SPECIAL ORDER.—The Electricity Committee has reported on the action it has taken in reference to the proposed arrangements with the Penrith Electric Supply Co., Ltd., for the Council's consent to give up its existing Orders, the company obtaining a Special Order in place thereof. Upon the advice of its Parliamentary agents, the Council decided to notify the company that if it declined to accept proper provisions to protect the Council and consumers in the carrying out of the arrangement originally made, the Council would be unable to consent to the granting of the Special Order.

Portland. — REDUCED CHARGES. — The Electricity Committee has reduced the charge for battery-charging purposes to 2d. for the first 1,500 kWh used per quarter and 1½d. for all above.

Portsmouth.—PRICE REDUCTIONS.—Following upon the substantial profit shown in the past year's accounts of the electricity undertaking, further concessions are to be made to all classes of consumers after the September quarter. Two new classes are to be instituted under the domestic tariff, with standing charges of 6s. 6d. per quarter for houses or flats under 800 sq. ft. and 7s. per quarter between 800 and 900 sq. ft., the present summer and winter rates of 0.5d. and 0.75d. per kWh respectively in the city being reduced to 0.4d. and 0.6d. per kWh, while rates outside the city of 0.75d. and 1d. respectively will be reduced to 0.5d. and 0.75d. Similar reductions will be made in the maximum demand tariff, in connection with which the standing charge will also be reduced by 10s. per kW per annum in the city, with corresponding adjustments for consumers outside. On the alternative lighting tariff a reduction of ½d. is to be made on the first 5,000 kWh per annum, and an estimated reduction of about £1,200 will be made in the charge for public lighting. For power, the price will be reduced by one-eighth of a penny per kWh after the first 10,000 kWh per quarter (or 40,000 kWh per annum), and the rate under the restricted-hour tariff will be reduced to ½d. per kWh. The following adjustments will be made in the rate for power outside the city: First 10,000 kWh per annum, 1¼d.; next 10,000, 1d.; next 20,000, ¾d.; all over 40,000 per annum, ½d.

Richmond (Surrey).—EXTENSIONS.—The Town Council is to offer no objection to the proposal of the Richmond (Surrey) Electric Light and Power Co., Ltd., to extend its l.p. mains from Richmond Hill to Petersham Road *via* Nightingale Lane.

Scarborough.—SUB-STATION INTERCONNECTION.—Permission has been granted to the Electricity Committee to lay an underground cable to interconnect the Seamer and Irton sub-stations.

Sheffield.—LOAN SANCTIONED.—Sanction has been received by the Electric Supply Department to borrow £6,028 for e.h.p. feeder mains, and £1,353 for the extension of mains on the Woodthorpe Housing Estate.

Shenfield (Essex).—STREET LIGHTING.—The Parish Council has decided to adopt electric street lighting.

Stafford.—REDUCED CHARGES.—The Electricity Committee recommends that the flat rate for lighting shall be 6d. per kWh, less 5 per cent. discount, compared with 7d. as at present, and for other purposes 1d. There is an alternative tariff (for all purposes) of a fixed charge of 5s. a year per 100 sq. ft. of floor area for the first 1,000 ft., plus 2s. 6d. a year per 100 sq. ft. of floor area over 1,000 ft., with a "unit" charge of 1d. For business premises, it is recommended that the charges for lighting shall be 6d. per kWh, with an alternative tariff of £2 5s. per kW of maximum demand per quarter, plus 2d. per kWh for the first 120 kWh for each kW of maximum demand, afterwards ¾d.. In respect of factories, &c., the committee recommends that the charge shall be £1 5s. per kW of maximum demand per quarter, plus ¾d. per kWh. It is proposed that a discount of 5 per cent. shall be available to consumers on total accounts.

LOAN.—Application is to be made for sanction to borrow £20,000 to cover prospective expenditure on mains, sub-station services, &c., for the next three years.

Stockton-on-Tees.—SUPPLY TO NEWTON BEWLEY.—The North-Eastern Electric Supply Co., Ltd., is to give a supply of electricity to Newton Bewley, and the Rural District Council has consented to the use of overhead lines.

Swansea.—NEW SUB-STATION.—The Electricity Committee is to erect a sub-station at Cwmrhydceirw.

Tenterden.—SUPPLY EXTENSIONS.—The Weald Electricity Supply Co., Ltd., has completed the provision of a supply of electricity to Rolvenden Layne, and a supply will be available for Newenden in about six weeks' time. A canvass has been made in Wittersham, Appledore, and Woodchurch, with a view to extensions to those parishes.

Tiverton.—LOANS SANCTIONED.—The Town Council has received sanction to loans of £2,866 for additional plant for the electricity works and £1,388 for feeder plant.

Uttoxeter.—OVERHEAD LINES.—The Urban District Council has received sanction to a loan of £1,600 for overhead mains, and the Ministry of Transport has consented to the erection of a duplicate overhead line from Marshington to Uttoxeter.

Wayland.—OVERHEAD-LINE EXTENSIONS.—The Rural District Council has approved an application by the East Anglian Electric Supply Co., Ltd., for permission to extend overhead lines to Watton in connection with the public lighting at that place.

A part of novel illuminations at Brighton installed to celebrate the "Brighton-Bristol Alliance" week (See note on page 395)

West Ward.—OVERHEAD LINE SCHEME.—The Westmorland Electricity Supply Co., Ltd., has forwarded to the Rural District Council plans of overhead lines to run from Penrith to Shap, *via* Hackthorpe, Great and Little Strickland, Newby, King's Meaburn, and Colby, where they will enter the East Westmorland rural district. The whole scheme will make a circuit round by Tebay, Ravenstonedale, and Kirkby Stephen. The Council has decided to offer no objection.

United States.—DRASTIC RATE REDUCTIONS.—The *Electrical World* reports that a reduction in residential electrical energy rates by 23 per cent. has been announced by the Alabama Power Company, effective as from September 1st, with Public Service Commission approval. The company serves 75,000 homes in the state, of which 8,000 are rural and suburban. The estimated saving to the public is $336,000 a year. The new rates, according to the Commission, change the line charge principle and substitute therefor monthly minimum charges to include 5 kWh. The lines having customer densities of fifteen customers or more will pay a monthly minimum charge of $1.25 and on lines having densities of less than fifteen customers the monthly minimum will be $2. Provisions are made for lowering the minimum charges on suburban lines and transferring suburban customers to the urban rate when appropriate customer densities prevail. In addition the former 10-kW-per-mile minimum contracted capacity requirements is reduced to 5 kW at the end of original contract period, thus reducing the annual charges on many lines as much as $90 a year. A downward revision of the company's rates and charges to cotton ginners has also been ordered by the Alabama Public Service Commission—a revision expected to save the 275 ginners served by the utility approximately $35,000. A further saving was offered ginners in the Commission's order instructing the company to grant a 5 per cent. discount for prompt payment of bills.

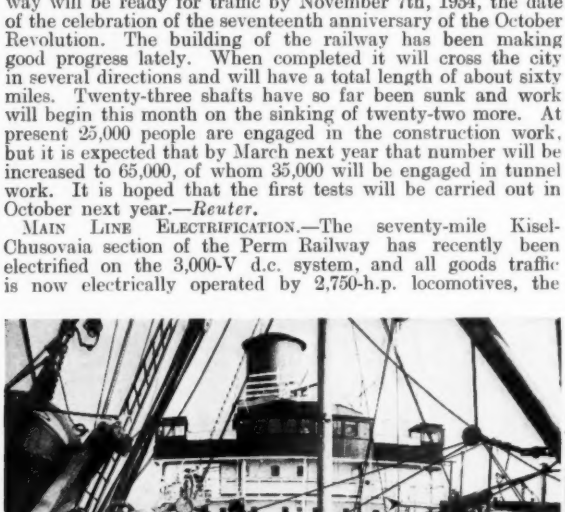
Traction

London.—GREEN PARK STATION.—A new "Underground" station, Green Park, was opened on Monday last. It is situated between, and replaces, the old Dover Street and Down Street stations, and has taken two years to build; it embodies all the latest "Underground" developments in architecture and utility. The long passages, as in the older stations, have been eliminated, as the escalators from the booking hall travel at 150 ft. per minute right down to the end of the platform.

"LONDON TRANSPORT."—The formal "London Passenger Transport Board" or the initials "L.P.T.B." are to be abandoned in favour of "London Transport" in all but statutory advertisements and announcements of the Board. The words will be incorporated in a circle in the fashion rendered familiar by the "Underground" system, and the new sign will soon be seen on all the various sections of the Board's vast undertaking.

Russia.—PROGRESS OF MOSCOW TUBE.—It is announced in Moscow that the first portion of the city's underground railway will be ready for traffic by November 7th, 1934, the date of the celebration of the seventeenth anniversary of the October Revolution. The building of the railway has been making good progress lately. When completed it will cross the city in several directions and will have a total length of about sixty miles. Twenty-three shafts have so far been sunk and work will begin this month on the sinking of twenty-two more. At present 25,000 people are engaged in the construction work, but it is expected that by March next year that number will be increased to 65,000, of whom 35,000 will be engaged in tunnel work. It is hoped that the first tests will be carried out in October next year.—*Reuter.*

MAIN LINE ELECTRIFICATION.—The seventy-mile Kisel-Chusovaia section of the Perm Railway has recently been electrified on the 3,000-V d.c. system, and all goods traffic is now electrically operated by 2,750-h.p. locomotives, the first seven of which were constructed in Italy, and the remainder at Moscow and Kolomna. Conversion work is now proceeding between Kisel and Perm on the Moscow-Siberia route.



The new Anglo-French cable. The left-hand picture taken aboard the cable-ship *Dominia* shows the cable being paid out over the side, and the right-hand one depicts the tractors hauling it over the Calais sands

Sheffield.—A QUICK JOB.—In four days the Corporation Tramways Dept. has completed a new loop line at the city terminus. This involved the laying of over a hundred yards of new tram track, with the necessary equipment for overhead wiring, the relaying of kerbstones, and the raising of part of the footpath.

Switzerland.—TROLLEY-BUSES.—A service of single-deck electric trolley-buses has recently been inaugurated between Lausanne and Ouchy by the Lausanne tramway authority. Although the route is only about one mile in length, it is very hilly, comprising gradients of 1 in 12. The service was started with two vehicles, the chassis of one of which was built by the Saurer Co., of Arbon, the other by the F.B.W. Co., of Wetzikon, the seating accommodation in both cases being for twenty-four persons, with standing room for an additional twenty. The buses have 38 by 9¾-in. pneumatic tyres, with a wheelbase of 19 ft., an overall length of 21 ft. 2 in., a width of 7 ft. 9 in., and a height of 8 ft. 10 in. The electrical equipment, which was made by the Brown Boveri Co., of Baden, comprises an 87.5-h.p. 650-V self-ventilating motor mounted between the two axles and driving the rear axle through a universal joint, reduction gearing and a differential. The motor is operated through contactors controlled by small pedal-operated controllers. A lighting dynamo and a battery deliver the current necessary for the contactors at 24 V. The buses are equipped with three brakes—an electric brake working on resistances, the object of which is to control the speed of the bus on gradients; a pneumatic brake acting on all four wheels; and a hand-controlled holding brake. As a result of the satisfactory operation of the first two vehicles, a third has lately been put into operation.

Communications

Australia.—WIRELESS ON SHIPS.—A marine court of inquiry which inquired into a disaster to a coaling ship has stated that all seagoing vessels on the Australian coast should be fitted with wireless apparatus. The Seamen's Union points out that the Adelaide Steamship Co. has installed in its small vessels wireless telephones costing £450. These have a range of 200 miles, and do not require the employment of a special wireless operator. A Government Committee is at present investigating the subject.

Brighton.—POLICE RADIO.—Last week all policemen on beat throughout the town were issued with "pocket" wireless receiving sets which will enable them to receive instructions from a transmitter which will be installed on the roof of the Town Hall.

Dover.—NEW SUBMARINE CABLE.—A new submarine telephone cable has been laid across the channel by the Telegraph Construction and Maintenance Co.'s cable ship, *Dominia*, between St. Margaret's Bay and Calais. The new cable is 26 miles in length, weighs 32 tons per mile, is 3 in. in diameter, and contains 76 wires.

Great Britain.—RADIO LICENCES.—During August 225,000 broadcast radio receiving licences were issued, the total number in force being 5,654,400, a net increase of 29,500. During that month 219 prosecutions were successfully undertaken, the fines amounting to £198.

RADIO RELAY SERVICES.—The Portsmouth Corporation reports that the Hants Relay Co., Ltd., has been registered in connection with the operation of a relay service, and that the agreement entered into with Mr. E. A. Wyatt will be assigned to the company. The Corporation has passed plans submitted on behalf of Mr. Wyatt for the erection of a station in Burrfield Road.

The Swindon Corporation has extended its agreement with Swindon Radio Relay Exchange, Ltd., which will expire on December 31st, 1935, for a further period of seven years from January 1st, 1936.

The Penybont R.D.C. has agreed to the establishment of services by the following applicants in various districts:—Mr. Sydney Waters, Kenfig Hill; Mr. T. J. Nelson, Pyle; and the Pencoed and District Radio Relay Co., Pencoed.

The Chippenham Corporation has refused to allow Swindon Radio Relay Exchange, Ltd., to operate a wireless exchange, as it is of the opinion that if there is a demand for such a service it can be met locally.

The Hornsea Highways Committee reports that the agreement with Broadcast Listeners' Service, Ltd., which provided for the formation of a company within six months, has not been complied with, and the committee therefore recommends determining the agreement.

The Highways Committee of the Paignton U.D.C. recommends the rejection of an application from South Western Electricity, Ltd., for permission to operate a relay service for a period of forty-two years.

India.—WIRELESS LICENCES.—Increasing interest in Empire broadcasts from England is considered to be partly responsible for a big increase in the number of wireless receiving licences taken out this year. During 1932 the number of licences was 8,557. During the first six months of this year, however, 6,276 licences were issued, as against 4,105 during the corresponding period last year. These figures were quoted by Sir Frank Noyce, Member for Industry and Labour, in the Assembly when the report of a select committee on more effective enforcement of the law regarding wireless licences was considered. He ascribed the increase in licences also to public anxiety to make their position a lawful one.—*Reuter* (Simla).

Irish Free State.—NEW BROADCASTING COMMITTEE.—A new Broadcasting Advisory Committee is about to be appointed, as the Committee that had been functioning ceased to exist the end of June last.

Contract Information

When "Contracts Open" are advertised in our "Official Notice" pages the date of the "Electrical Review" containing the advertisement is given in parentheses below

Contracts Open

Adwick-le-Street.—September 25th. Urban District Council. 1,600 prepayment meters. (September 8th.)

Australia.—MELBOURNE.—Post and Telegraph Department. September 26th. Bell sets and portable telephones. (A.Y. 11963.)*

October 31st. Condensers for use in radio transmitters. (A.Y. 11983.)*

November 14th. Ringing dynamotors. (A.Y. 11984.)* Telephone ringers. (A.Y. 11986.)* Submarine telephone cable. (A.Y. 11973.)*

October 30th. State Electricity Commission of Victoria. 6,600-V current-limiting reactors. (A.Y. 11971.)*

Belgium.—ANDERLECHT.—September 25th. Hotel Communal. Meters. Particulars for 3 fr. from Regie de l'Electricité, 4, Rue Van Lint, Anderlecht.

Birkenhead.—September 28th. Mersey Railway Co. Metallic and carbon filament lamps and fittings. Mr. J. Shaw, general manager and secretary, Central Station, Birkenhead.

Brazil.—RIO GRANDE.—September 29th. Viacas do Rio Grande do Sul. 1,000 dry cells for telephones. (A.Y. 11969.)*

Cheadle and Gatley.—September 28th. Electricity Department. Kiosk sub-station, switchgear, and static transformer. (September 15th.)

Dumbarton.—October 6th. County Council. Electrically operated swing bridge over the Forth and Clyde Canal at Erskine Ferry Road, Old Kilpatrick. Messrs. Crouch & Hogg, chartered civil engineers, 17, Lynedoch Street, Glasgow (deposit £5 5s.).

Dumfries.—September 29th. Dumfries and Galloway Joint Sanatorium Board. Wiring installation work, comprising additions and alterations to the existing installation at the sanatorium near Lochmaben. Specifications from Mr. John Robson, clerk of the Board, County Buildings, Dumfries.

Egypt.—CAIRO.—October 5th. Ministry of the Interior. Main switchboard, four distribution panels, earthing materials, instruments and reactance coils. (A.Y. 11957.)*

November 14th. Pumps, electric motors, boilers, &c. (G.Y. 12912.)*

ALEXANDRIA.—October 25th. Ports and Lighthouses Administration. Electric cables, switchgear, transformers, electrically driven hauling winches and motors for the port of Alexandria. Chief inspecting engineer, Egyptian Government, 41, Tothill Street, London, S.W.1. (Specifications, &c., 12s., not returnable.)

GIZA.—October 5th. Ministry of Education. Cables, switchboards and other electrical apparatus. (A.Y. 11957.)*

Erith.—September 25th. Electricity Department. 500-kVA transformers. (September 15th.)

Glasgow.—October 5th. Corporation. Electrical work at Trades School, Shamrock Street. Specifications from Education Offices, 129, Bath Street; offers to Town Clerk.

Grays Thurrock.—October 11th. Electricity Department. Transformer kiosks, h.p. switchgear, 3,300-V and l.p. cables, &c. (See this issue.)

Great Western Railway.—September 28th. Telegraph instruments, electrical apparatus, &c. (September 15th.)

Guildford.—September 25th. Corporation. Installation of electric lighting, &c., at Council Offices, Millmead House. Mr. J. W. Wilton, Millmead House, Guildford (deposit £1 1s.).

India.—NEW DELHI.—December 4th. Indian Stores Department. 220 230-V, single-phase, 50-cycle ceiling fans. (A.Y. 11959.)*

December 11th. D.c. ceiling fans. (A.Y. 11965.)*

January 8th. A.c. and d.c. table fans. (A.Y. 11967.)*

October 25th. A.c. and d.c. meters. (A.Y. 11968.)*

Lanark.—September 26th. County Council. Various works, including electric lighting for forty-four houses at Baillieston. Particulars from Mr. P. C. Smith, County Housing and Town Planning Engineer, 13, Clydesdale Street, Hamilton.

New Zealand.—WELLINGTON.—October 26th. Post and Telegraph Department. 12-V switchboard lamps (A.Y. 11955)* and telephone gongs and attachment nuts. (A.Y. 11956.)*

October 31st. Metal-cased condensers. (A.Y. 11954.)*

South Africa.—JOHANNESBURG.—October 28th. City Council. Five sets of electrically operated traffic signals. (A.Y. 1191.)*

October 14th. Six 3-phase, metal-clad h.p. switchgear units. (A.Y. 11981.)* Metal-clad l.p., a.c. switchgear. (A.Y. 11980.)*

October 28th. Two single-phase 1,620-kVA transformers. (A.Y. 11982.)*

Swansea.—October 9th. Electricity Department. Coal-handling plant for the new Tir John power station. (September 8th.)

Wick.—September 30th. Town Council. Electric lighting work for housing scheme. Burgh surveyor (deposit £1 1s.).

*Further particulars can be obtained at the Department of Overseas Trade (Inquiry Room), 35, Old Queen Street, S.W.1.

Contracts Closed

Barnes.—Town Council. Accepted. Cables (£881).—Siemens Bros. & Co., Ltd.

Burton-on-Trent.—Electricity Committee. Accepted. Switchboards for Station Street sub-station (£599) and voltage regulating equipment (£2,042).—Metropolitan-Vickers Electrical Co., Ltd.

Darvel.—Town Council. Accepted. Installation of electric lighting in houses (£96).—M. & R. Young.

Dorchester.—Lighting Committee. Accepted. Feeder cables in Maumbury Road, &c. (£1,029).—Johnson & Phillips, Ltd. Two feeder pillars and two disconnecting boxes (£59).—Lucy & Co.

Glasgow.—Corporation. Police Committee. Accepted. Electric lighting work at alterations at Southern Divisional Police Office (£65).—Woodward, Sons & Co., Ltd.

Education Committee. Accepted. Electrical work at Carnwadric temporary school extension (£170).—D. A. McLarty.

Government Contracts.—The following contracts were placed by the various Government departments during August:—

ADMIRALTY (CONTRACT AND PURCHASE DEPARTMENT).

Electric cable.—St. Helens Cable & Rubber Co.

Ebonite containers.—I.R.G.P. Co.

Jack and terminal blocks, terminal eyes and washers.—Ediswan.

Retubing motor coolers.—Lawrence Scott & Electromotors.

Motor generators.—Mawdsleys. Sub-contractors: E. N. Bray for control gear.

H.p. switchgear.—A. Reyrolle & Co.

Telephones.—A. Graham & Co.

Transmitters and modulators.—Gambrell Bros.; Marconi's.

W/t silica valves.—Mullard Radio Valve Co.

Electrically-driven capstan gear.—Napier Bros.

WAR OFFICE.

Electric cable.—Enfield Cable Works.

Submarine cable.—Siemens Bros.

Carbons.—G.E.C.

Generating sets.—Ruston & Hornsby.

AIR MINISTRY.

Accumulators.—Peto & Radford.

Recording equipment (Marconi-Stille).—Marconi's.

POST OFFICE.

Telephonic apparatus.—Automatic Electric Co.; Ericsson Telephones; G.E.C.; Plessey Co.; Siemens Bros.; Standard Telephones; Telephone Mfg. Co.

Testing and protective apparatus.—G.E.C.; Phœnix Telephone & Elec. Wks.

Wireless apparatus.—Standard Telephones.

Cable.—B.I. Cables; Connollys (Blackley); Hackbridge Cable Co.

Submarine cable.—Siemens Bros.

Secondary cells.—D.P. Battery Co.

Loading coils.—Siemens Bros.; Standard Telephones.

Telephone cords.—Phœnix Telephone & Elec. Wks.

Cable drums.—Siemens Bros.

Power equipments.—G.E.C.

Electric lighting fittings.—Venner Time Switches.

Insulators.—T. De La Rue & Co.; Doulton & Co.; Litholite Insulators.

Electric lamps.—Crompton-Kye Lamp Sales.

Flameproof wire.—Concordia Electric Wire Co.; London Elec. Wire Co. & Smiths.

Switchboard wire.—B.I. Cables.

Telephone exchange equipment. Liberty (London) and Central (London): Ericsson Telephones. Prestwich (Manchester) and Bishopsgate (London): Automatic Electric Co. Macaulay (London)., Burnley, Keighley: G.E.C. Beckenham and North (London): Siemens Bros. & Co. Rochdale: Welbeck (London); Cambridge; London Trunk Exchange (E.C.): Standard Telephones.

Voice frequency telegraph equipment.—Birmingham, Liverpool: Standard Telephones.

H.M. OFFICE OF WORKS.

Electric lifts at Westminster County Court.—Etchells Congden & Muir.

CROWN AGENTS FOR THE COLONIES.

Copper wire.—Whitecross Co.

Floodlight.—Chance Bros.

Screening and pulverising plant.—Edgar Allen & Co.

Telephone materials.—G.E.C.

Heston and Isleworth.—Electricity Commitee. Accepted. L.p. switchboard (£272).—General Electric Co., Ltd.

Ipswich.—Electricity Committee. Recommended. Three oil switches and two 1,000-kVA and four 500-kVA transformers for sub-stations at Barrack Corner and Major's Corner (£3,350).—General Electric Co., Ltd. Switchgear for sub-stations.—General Electric Co., Ltd. (£556); Crompton Parkinson, Ltd. (£874); Metropolitan-Vickers Electrical Co., Ltd. (£887).

Isle of Wight.—County Education Committee. Accepted. Completing the electric lighting installation at Newport secondary schools (£78).—E. Harding.

Kesteven.—Buildings Committee. Accepted. Electric lighting installation at Grantham Institution (£869).—A. Ford, Ltd. Refrigerating plant at Grantham Institution (£237).—J. and E. Hall.

Lichfield.—City Council. Accepted. Duplicate feeder (£5,452).—Standard Telephones & Cables, Ltd.

London.—HACKNEY.—Electricity Committee. Recommended. E.h.p. and l.p. cables with jointing materials (£11,029).—British Insulated Cables, Ltd.

Paisley.—Corporation. Accepted. Electrical work at Barterholm (354 houses) and Gallowhill (264 houses).—J. R. Brodie & Co.

Portland.—Electricity Committee. Accepted. Two-part tariff meters.—British Sangamo Co., Ltd.

South Africa.—CAPE TOWN.—Electricity Committee. Recommended. 1,000 Ferranti meters (£2,775).—Messrs. Rice & Deithelm, Ltd. 1,000 measurement meters (£2,842).—Associated Engineers Co., Ltd.

Accepted. Cables.—British Insulated Cables (S.A.), Ltd. (£1,965); Hubert Davies & Co., Ltd. (£1,234); Dowson, Dobson & Behr, Ltd. (£2,072); Siemens Bros. & Co. (British), Ltd. (£1,137).

Swansea.—Education Committee. Accepted. Electrical installation at Gors school (£209).—T. E. F. Whitear, Ltd.

Whitburn.—Town Council. Electrical installations at housing schemes (£507).—A. Moore.

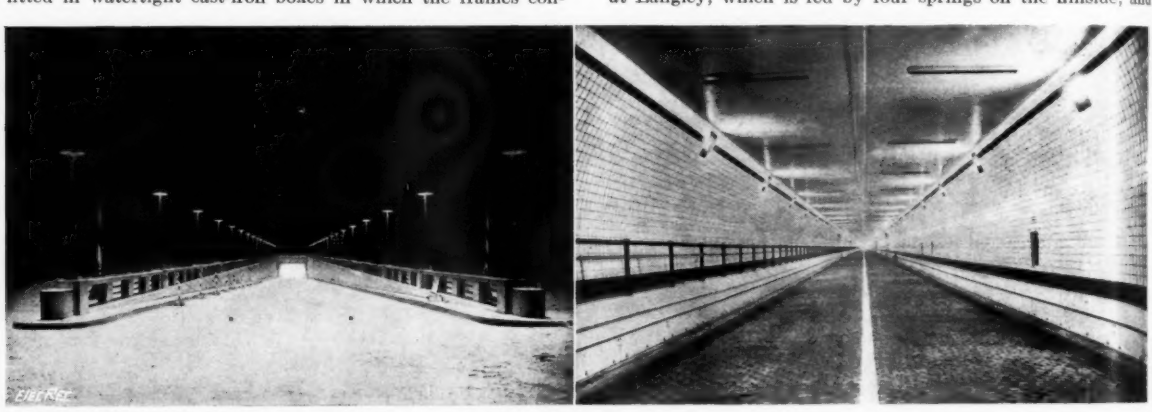
Notes

A Bright Idea

British News Theatres, Ltd., had a really excellent idea when they decided to open one of their short-programme cinemas at Victoria Station. When waiting for departing or arriving trains one likes to be within easy reach of the station, and it is hard to find occupation during a wait of an hour or so. This news theatre will thus meet a real need. The building is a handsome one, as will be judged from the pictures on page 387; Mr. Alister G. McDonald, A.R.I.B.A., was the responsible architect, the steelwork having been designed by Mr. S. W. Budd, A.M.Inst.C.E. The complete electrical installation is the work of the Berkeley Electrical Engineering Co., Ltd., and the cinema company's staff. There is a B.T.-H. extended frequency range sound reproducer supplied by Sound & Cinema Equipment, Ltd. The Major Equipment Co., Ltd., was responsible for the neon signs on the front of the theatre, and also for the projection room switchboard and lighting effects apparatus.

Sodium Lamps in the Scheldt Tunnel

The Scheldt Tunnel at Antwerp, opened on September 10th by the King of the Belgians, is another example of the efficiency of the new type of Philips sodium lamp. The tunnel for traffic, approximately 1¼ miles in length, is lighted by 532 lamps of 100 W, and another 78 lamps are mounted along the approaches to the tunnel. As will be seen from the accompanying illustrations the illumination obtained is remarkably good. The lamps are built into the wall of the tunnel, and are fitted in watertight cast-iron boxes in which the frames containing the reflector, the lamp, and its accessories are mounted, the whole being enclosed by a "Philite" window-frame with a hinged lid. In the event of the electricity supply breaking down at the power station, an emergency lighting installation provides for sufficient light in the tunnel, for which purpose an ordinary electric lamp connected to a storage battery is mounted in every fourth box. In addition, Philips have installed sodium lighting along the Italie-Lei, the avenue leading to the tunnel, whilst a similar installation is shortly to be fitted up on the Rijnplaats.



One of the approaches and the Scheldt Tunnel illuminated by Philips sodium lamps

Industrial Supplies and the Grid

Another of the largest industrial concerns in the country has decided to take a public supply for the whole of its electrical requirements. The company is Messrs. J. and P. Coats, Ltd., the thread manufacturers, whose principal mills are at Paisley. The decision follows negotiations between the company, the Central Electricity Board and the Paisley Corporation. The company has three Mills at Paisley, namely, the Mile End Mill, Anchor Mill and Ferguslie Mill, and until recently it produced its own power requirements at each. Some twelve months ago Messrs. Coats closed down their power plant at Mile End and substituted a public supply, taking some 3¼ million kWh per annum. Three months ago they decided to take a public supply for their Anchor and Ferguslie Mills; the supply to the former was commenced last month, and is at the rate of about 7¼ million kWh per annum.

The construction work for connecting up the Ferguslie Mill is proceeding with a view to making the public supply available as soon as possible. This is the largest of the company's mills with a present consumption of about 18 million kWh per annum. The present total electricity requirements of the company, therefore, amount to some 28¼ million kWh per annum. The C.E.B. is now supplying the whole of the electricity requirements of the Paisley undertaking; the additional load involves the reinforcement of the grid connection to Paisley by the installation of two additional 15,000-kVA transformers, duplicating those already provided for supplying the Corporation. The Corporation is providing the connections from its point of supply to the mills, and this involves the provision of two 6.6-kV cables to both the Mile End Mill and the Anchor Mill, and three 22-kV cables, together with transformers and switchgear, for connection to the Ferguslie Mill.

The company's power plant at the Anchor Mill is closed down and entirely superseded, but the agreement provides that the generating plant at the Ferguslie Mill, which is relatively modern and efficient, shall, if and when required by the C.E.B., be operated for peak-load purposes in parallel with the grid so as to generate a part of the company's requirements during the remainder of its useful life. The costs thereby incurred by the company will be refunded.

Electrical Research in Russia

In the course of a recent address in Paris, M. Michel Chatelain, of the Russian Academy of Science, Leningrad, gave some particulars of the electrical research work which is at present being carried out in Russia. He stated that in connection with e.h.p. installations a 500,000-V three-phase transmission line about 1¼ miles in length and an installation for securing an instantaneous electrical discharge at a pressure of 10 million volts had been set up at the Electrotechnical Institute in Leningrad. In Moscow a special department has also been established to carry out research work in connection with railway electrification.

Quick Work!

Messrs. Mather & Platt inform us that they received a telephone order at 10 a.m. on September 9th from the Macclesfield Corporation for an emergency pumping plant; within ten working hours they had installed a 2½-in. "Medivane" pump with a capacity of 3,400 gal. per hr. at 100 ft. head, driven by a 7½-h.p., 400-V, 1,500/1,420-r.p.m., 3-phase, 50-cycle, squirrel-cage induction motor, complete with control-gear valves and suction and delivery piping. The water supply has been obtained by creating a dam across the Pyegreave stream at Langley, which is fed by four springs on the hillside, and in the event of rain and an increase in the water supply from the springs the pump is capable of delivering a larger output. As a result of this quick work Macclesfield water supply is now increased by approximately 70,000 gal. per day.

Educational

The Royal Technical College, Glasgow, has issued its calendar for the 1933-34 session. This, as in previous years, contains full particulars of the various classes and courses.

Mr. N. W. McLachlan, D.Sc., M.I.E.E., is to give a course of twelve lectures on "Loud Speakers and Acoustic Problems" at the Borough Polytechnic on Mondays at 6 p.m., commencing on October 2nd.

The Sir John Cass Technical Institute, Jewry Street, E.C., has issued its syllabus of classes for the 1933-34 session. With the syllabus the Institute has published a booklet on "Modern Metallurgy," which contains illustrations and particulars of the equipment installed in the Department of Metallurgy.

Appointment Vacant

Lecture-demonstrator for Glasgow Corporation. (See our classified advertisements.)

Forthcoming Events

Batti-Wallahs' Society.—Wednesday, September 27th. Hotel Metropole, W.C. 12.30 for 12.55 p.m. Luncheon. "Our Industrial Future." Mr. A. P. Young.

Electrodepositors' Technical Society.—Wednesday, September 27th. Lyons' Angel Café, N.1. 7.30 p.m. Reunion. Discussion on "Removal of Electrodeposits by Stripping." Messrs. F. L. James and J. W. Perring.

Electrical Power Engineers' Association (*Southern Division*).—Saturday, September 30th. Holborn Restaurant, W.C. 5.30 for 6 p.m. Annual dinner.

Birmingham Electric Club.—Friday, September 22nd. Grand Hotel, Birmingham. 7 p.m. "The Interference of Electrical Plant with the Reception of Radio." Mr. A. Morris.

National Smoke Abatement Society.—September 22nd-24th. Sheffield. Annual Conference.

Makers' Names Wanted

ROBINA hair dryer.
ABAKO hair dryer.

Our Personal Column

Electrical men are invited to enable us to keep readers of the "Electrical Review" posted concerning their movements

Mr. G. P. Pierpoint, consumers' engineer with the Dumfriesshire County Council Electricity Department, has been appointed inspector by the States of Guernsey Electricity Department, and will take up his new duties on October 2nd.

Mr. C. E. M. Young, charge engineer at the power station of the Banbury and District Electric Supply Co., Ltd., was, on September 15th, presented by his colleagues with a case of cutlery on the occasion of his marriage to Miss Ivy Smith. The presentation was made by Mr. J. H. Davies, district representative for the Banbury area of the Shropshire, Worcestershire and Staffordshire Electric Power Co. The wedding took place on September 20th at Twyford Parish Church.

Mr. R. D. Maynard, of Scarborough, has been appointed mains assistant to the Cannock Urban District Council.

Mr. F. E. Allen, of the Portsmouth electricity undertaking, has been appointed charge engineer in Gravesend Electricity Department.

Mr. B. C. Oldham, of the drawing office staff of the British Thomson-Houston Co., Ltd., at Rugby, and Miss Eda L. Sutton, who has been in the cost department, were married recently. The former received a collection of cutlery from his colleagues, and the latter a Shelley china tea service from the cost department staff.

Mr. C. G. Mayer, A.M.I.E.E., was married at Herne Bay Parish Church on September 16th to Miss Stella Cursons, of Herne Bay.

Sir John Cadman is to be presented with the Melchett Medal at the annual dinner of the Institute of Fuel on October 18th.

Mr. W. F. Russell, city electrical engineer, Lichfield, has been granted an increase in salary by the Council from £300 to £450 per annum up to and including the sale of 1,000,000 kWh. with a further £20 for each additional 100,000 kWh.

Mr. S. R. Mullard has been elected chairman of the British Radio Valve Manufacturers' Association for the ensuing year, in succession to **Mr. W. W. Burnham.** Mr. Mullard was formerly vice-chairman of the Association, and this office is now filled by **Mr. J. H. Williams.**

The Electro-Mechanical Brake Co., Ltd., of West Bromwich, who have been inundated with applications for the post formerly occupied by Mr. M. S. Montgomerie (ELECTRICAL REVIEW, September 15th, p. 369), ask us to state that there is at present no vacancy in their London office.

A *Reuter* message from Athens states that the papers in connection with the United States' application for the extradition of **Mr. Samuel Insull,** Senior, were handed to the Foreign Ministry on September 19th by Mr. Harness, the representative of the American judicial authorities.

Mr. W. E. Maclean, managing director of International Combustion (Australasia), Ltd., whose headquarters are at Sydney, has been appointed by the Tasmanian Government to be commissioner of the Hydro-Electric Department of Tasmania, in succession to the late Mr. H. A. Curtis. The salary is £1,750 a year, less the statutory reduction of 20 per cent. Mr. Maclean, who was born in Sydney in 1884, has had electrical engineering experience in England, Canada, and the United States, as well as in Australia. In 1919-20 he carried out investigations for the Tasmanian Department relating to the proposed power development of the Huon River and Lake Rolleston. From April, 1920, he was engineer-in-chief at Miena in connection with the construction of the Great Lakes dam. He spent the greater part of 1926 in England on investigations for International Combustion, Ltd. (London), relative to central electric and power-generating stations. He has been manager of International Combustion (Australasia), Ltd., since 1927. There were sixty-five applicants for the position.

[*Elliott & Fry*

Mr. J. Lesser, A.I.H.V.E., the author of the article on "Warming Buildings by Electricity" on page 382 of this issue, has been actively engaged in developing the use of electricity for warming buildings

Mr. C. J. Jones, late of the General Electric Co., Ltd., Bristol, has been appointed to the staff of the Wholesale Electrical Department of Messrs. Gardiner, Sons & Co., Ltd., as outside representative for Bristol and local districts.

Reference to the architect for the new Northumberland Heath senior school was inadvertently omitted from the description of the electrical features of this school in our last issue. The school was designed by **Mr. H. Hind,** the engineer and surveyor to the Erith Urban District Council, who is also architect to the Education Committee. The electrical specifications, however, were prepared by the Council's electrical engineer, **Mr. J. C. Williams,** A.M.I.E.E., who took a great deal of interest in the application of electricity to education as exemplified in the fittings and equipment of this new school.

Mr. J. C. Williams

Mr. T. E. Daniel, A.M.I.Mech.E., A.M.I.E.E., the deputy electrical engineer at Ashton-under-Lyne, has been appointed by the Town Council as borough electrical engineer from August 1st, at a salary of £750 per annum. Mr. Daniel succeeds Mr. N. Applebee, who has retired from that position. As we have already announced, Mr. Applebee has been appointed consulting engineer to the Council for a period of three years.

Mr. T. S. Parkinson, mains superintendent with the St. Helens Corporation Electricity Department, who was married recently to Miss F. Massicks, has been presented with a synchronous electric clock by the staff of the Department.

Mr. H. E. Benwell has rejoined Messrs. Best & Lloyd, Ltd., with whom he was previously connected for many years.

Obituary

We learn with deep regret that the younger son of **Sir Duncan Watson**—Douglas Ian—of Hollycroft Avenue, Hampstead, was killed in a motor cycle accident at St. John's Wood on Saturday night. He was twenty-one years of age. Sir Duncan Watson, who is a member of the Central Electricity Board, and has been for the whole of his career closely connected with electrical affairs, including the business of Duncan Watson (Electrical Engineers), Ltd., of Berners Street, and for many years the Marylebone electricity supply undertaking, has the sympathy of a host of electrical friends, including the editors of the ELECTRICAL REVIEW.

Mr. C. L. Watt, well known in Australia for his work in connection with tramways, has died in Melbourne at the age of eighty-six. Born in New Zealand, Mr. Watt went to Melbourne in 1893 as engineer and mechanical draughtsman for the cable tramway system then under construction. Afterwards he was employed by the Melbourne and Metropolitan Board of Works. Mr. Watt was the inventor of a bell ticket punch which, until then, had been imported from the United States. He also invented catches for tramcars and railway trains, and slip rails, besides other engineering inventions, including a totalisator.

Mr. H. W. Darling.—A *Reuter* message from Schenectady reports that Mr. Henry W. Darling, who was treasurer of the American General Electric Co. for more than thirty years, has died at his home at Schenectady. Mr. Darling was president of the Canadian Bank of Commerce at Toronto before he joined the Edison General Electric Co., New York, in 1890. He resigned his position with the American General Electric Co. in 1924.

Mr. W. Gould.—The death is announced, at the age of sixty-three years, of Mr. W. Gould, who was one of the oldest members of the staff at St. Albans of the North Metropolitan Electric Power Supply Co., Ltd., with whom he had been since 1908. He was previously with Callender's Cable & Construction Co., Ltd.

Mr. J. S. Manning.—The death is announced, at the age of eighty-three, of Mr. John S. Manning, of Bristol, who for twenty-eight years had been on the electrical staff of the Bristol Tramways and Carriage Co.

Mr. J. H. Meade.—The death has occurred, at the age of forty-four years, of Mr. John Henry Meade, of Camberley, chief electrical engineer in the R.A.E., to which he had been attached since 1903.

Wills.—Mr. H. Carrington, D.Sc., A.M.I.C.E., A.M.I.M.E., lecturer in engineering in the College of Technology and the University, Manchester, left £1,231 (net personalty £937).

Mr. A. R. Everest, consulting engineer to the British Thomson-Houston Co., Ltd., left £3,829 (net personalty £3,709).

Financial Section

New Companies, Returns of Share Capital, Debenture Charges, Reports of Electrical Companies, Dividend Changes, Transactions in Stocks and Shares

New Companies Registered

Higgs Motors, Ltd.—Registered as a "private" company on September 16th, with a nominal capital of £100,000 in £1 shares. The objects are to acquire the business of an electrical motor manufacturer carried on by W. F. Higgs at Witton, Birmingham, as Higgs Motors, and to carry on the business of mechanical and electrical engineers, manufacturers, contractors and suppliers of electric motors, dynamos, engines, pumps and vehicles and components, accessories and tools used in connection therewith, &c. The subscribers are: Walter F. Higgs, 48, Selly Wick Road, Selly Park, Birmingham; and Thomas W. Horton, 4, Bennetts Hill, Birmingham. Walter F. Higgs is permanent governing director. Solicitors: Wragge & Co., 4, Bennetts Hill, Birmingham.

Watamps, Ltd.—Private company. Registered September 16th. Capital, £500 in 5s. shares. Objects: To carry on the business of sound amplification, and that of radio specialists, wireless and amplifier set manufacturers and designers, dealers in cinematograph apparatus, &c. The directors are: Capt. Arthur H. T. Chetwynd, O.B.E., 74, Kensington Park Road, W.11; Richard Gambier-Parry, 12b, Russell Road, W.14. Secretary: M. Weinbren. Registered office: 517, Thames House, Millbank, S.W.1.

Morris Heating Appliances, Ltd.—Private company. Registered September 16th. Capital, £3,600 in 1,200 7½ per cent. cumulative preference and 2,400 ordinary shares of £1 each. Objects: To carry on the business of manufacturers of and dealers in oil and electrical heating apparatus, &c., and to adopt an agreement with M. Lardner and G. W. Skinner. The directors are: G. Russell, 19, Mount Avenue, Ealing, W.5; M. Lardner, 74, Chiltern Court, Baker Street, W. Registered office: Albion House, 59 and 61, New Oxford Street, W.1.

Directional Sound Apparatus, Ltd.—Private company. Registered September 15th. Capital, £3,000 in 2,000 6 per cent. preferred shares of £1 and 20,000 ordinary shares of 1s. each. Objects: To carry on the business of manufacturers of and dealers in wireless receiving and transmitting sets and accessories, &c. The subscribers are: D. M. Goodrick, 63, Beryl Road, Hammersmith, W.6; and A. Mellish, 18, Water Lane, Stratford, E.15. Registered office: 78, Milton Street, E.C.2.

Walter Balmford, Ltd.—Private company. Registered September 16th. Capital, £5,000 in £1 shares. Objects: To acquire the business of an electrical and radio wholesaler now carried on by Walter Balmford at Electric House, 116, Steelhouse Lane, Birmingham. The subscribers (each with one share) are: Walter Balmford, 116, Steelhouse Lane, Birmingham; and Mrs. Florence M. Balmford, 653, Walsall Road, Hamstead, Birmingham. W. Balmford is permanent director. Solicitors: Thomas W. Pickup, 23, Colmore Row, Birmingham.

Modern Electrical Appliances Co., Ltd.—Private company. Registered September 12th. Capital, £500 in 2s. shares. Objects: To carry on the business of financiers, company promoters, manufacturers of and dealers in all kinds of electrical apparatus, &c. The subscribers are: H. S. Cowx, 347, City Road, E.C.1; and R. T. Brown, 56, Cranbrook Road, East Barnet, Herts. H. S. Cowx is the first director and manager. Registered office: 347, City Road, E.C.1.

J. Brand, Ltd.—Private company. Registered September 11th. Capital, £1,000 in £1 shares. Objects: To acquire the business of an electrical engineer and contractor hitherto carried on by Joseph Brand at 4, Margaret Street, W.1. The directors are: J. Brand and Mrs. Emily M. E. Brand, both of 12, Hamilton Way, Finchley, N.3. Registered office: 4, Margaret Street, W.1.

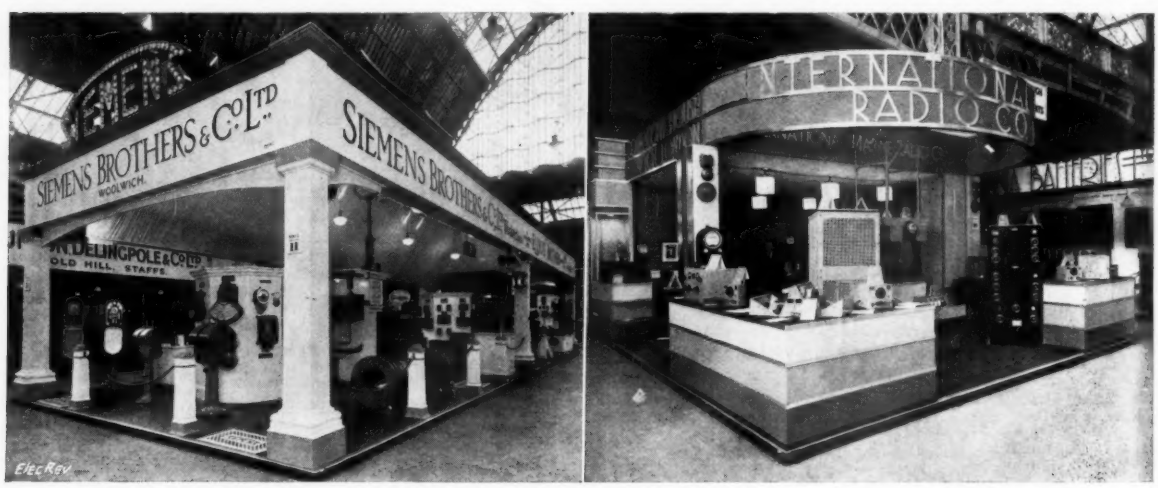
Radio Exchange Service, Ltd.—Private company. Registered September 6th. Capital, £500 in £1 shares (50 preference and 450 ordinary). Objects: To carry on the business of manufacturers of and dealers in wireless apparatus, gramophones, &c. The permanent directors are: A. A. Ashcroft, Normandene, Hull Road, Hessle; and W. Cardwell, 4, Division Road, Hull. Registered office: 4, Division Road, Hull.

Tropical Radio Equipment Co., Ltd.—Private company. Registered August 28th. Capital, £1,000 in £1 shares. Objects: To carry on the business of manufacturers of and dealers in wireless, gramophone and sound-reproducing machines and apparatus, electrical accessories, batteries, &c. The subscribers are: T. H. Pawley, 43, The Broadway, Thorpe Bay; and E. C. Maylon, 25, Henrys Avenue, Woodford Green. Secretary: Fredk. H. Coopey, 12, Alexander Road, Chadwell Heath. Registered office: Station Works, Station Road, Chadwell Heath.

Geo. Wilkinson (Wireless), Ltd.—Private company. Registered August 30th. Capital, £3,000 in £1 shares (1,000 preference and 2,000 ordinary). Objects: To acquire the business of a wireless and electrical engineer carried on by G. Wilkinson at 47, and 48, Cannon Street, Preston, as "Wilkinson's Wireless and Electrical Co." The permanent directors are: G. Wilkinson, 47, Cannon Street, Preston; and J. M. Toulmin, Garthrigg, Lightfoot Lane, Broughton, Preston. Solicitors: Buck & Dicksons, Preston.

Syd Davis (West Bromwich), Ltd.—Private company. Registered September 14th. Capital, £1,500 in £1 shares. Objects: To carry on the business of electricians, electrical, general or mechanical and radio engineers, manufacturers of and dealers in radio goods, electrical components, &c. The directors are: Sydney Davis, 157, New Street, West Bromwich; and Mrs. Doris Davis, 157, New Street, West Bromwich. Registered office: 67, High Street, West Bromwich.

Thomson Coventry, Ltd.—Private company. Registered in Edinburgh September 9th. Capital, £1,000 in £1 shares. Objects: To carry on the business of electricians, electrical and radio supplies merchants, mechanical, motor and radio engineers, &c. The directors are: Robert Whyte, 104, Buccleuch Street, Glasgow; Thomas Coventry, "Avalon," Sutherland Drive, Giffnock; and Thos. Geates, jnr., 308, Shawbridge Street, Glasgow. Registered office: 97, Douglas Street, Glasgow.



The well-planned exhibits of Messrs. Siemens Brothers & Co., Ltd., and the International Marine Radio Co., Ltd., at the Shipping, Engineering, and Machinery Exhibition now being held at Olympia, London

Grid Appliances Co., Ltd.—Private company. Registered September 4th. Capital, £100 in 5s. shares. Objects: To manufacture and construct, sell and dispose of objects appertaining to electrical, chemical and general engineering, and general domestic appliances; and to acquire a licence to work an invention relating to an electric radiator, wherein an oil or other liquid of high boiling point is used as the medium for circulating or transferring the heat described in provisional specification No. 6710. The subscribers are: L. Parkin and Bessie M. Hill, both of 12, Henrietta Street, W.C.2. Solicitors: Ashfield Rose & Co., 12, Henrietta Street, W.C.

Returns of Electrical Companies

Altrincham Electric Supply, Ltd.—Capital, £210,000 in 50,000 ordinary, 49,650 first preference, and 103,250 second preference shares of £1 and 140,000 deferred shares of 1s. Return dated April 12th, 1933. 50,000 ordinary, 45,000 first preference, 63,350 second preference, and 140,000 deferred shares taken up. £105,350 paid on 50,000 ordinary, 45,000 first preference, 10,000 second preference, and 7,000 deferred shares. £60,000 considered as paid on 53,350 second preference and 133,000 deferred shares. Mortgages and charges, £169,583 6s. 8d.

Pirelli-General Cable Works, Ltd.—Particulars filed of debenture stock to secure £600,000 and premium of 5 per cent. authorised June 13th, 1933, and covered by trust deed dated July 31st, 1933, the whole amount being now issued. Property charged: Freehold and leasehold properties in Southampton and Eastleigh, and the company's undertaking and other property and assets, present and future. Trustees: British Trusts Association, Ltd., 32, Bishopsgate, E.C.

Nigerian Electricity Supply Corporation, Ltd.—Particulars have been filed of debenture stock to secure £300,000 and a contingent premium not exceeding three per cent. authorised August 2nd, 1933, and secured by trust deed dated August 24th, 1933, the amount of the present issue being £220,000. Property charged: Properties, &c., in Nigeria, and the company's undertaking and other property, present and future, including any uncalled capital. Trustees: Prudential Assurance Co., Ltd.

Goldvick Electrical & Radio Co., Ltd.—P. J. Goodchild, 19, London Wall, E.C.2, ceased to act as receiver and manager on September 7th.

Wireless-Electric (Wholesale), Ltd.—The nominal capital has been increased by the addition of £1,750 in £1 ordinary shares beyond the registered capital of £1,650.

Key Engineering Co., Ltd.—Capital, £5,000 in 4,993 ordinary and seven deferred shares of £1. Return dated March 6th, 1933. 4,070 ordinary and seven deferred shares taken up. £4,077 paid. Mortgages and charges, £5,000.

John Bennie, Ltd.—Mortgage on certain specified debts and sums due or to become due under contracts dated August 31st to secure £1,898 16s. and a premium thereon of £73 4s. Holder: T. W. Hayes, 31, Bracken Gardens, Barnes.

Phœnix Telephone and Electric Works, Ltd.—Land registration charge on 3 and 5, Evelyn Avenue, Kingsbury, dated August 29th to secure £1,200. Holder: Mrs. M. Bruce, St. Ninians, Hatch End, Middlesex.

H. Norman Kirk, Ltd.—Mortgage on properties in Swansea, dated August 22nd, supplemental to mortgages dated July 2nd and August 20th, 1931, collaterally securing £4,000. Holder: W. W. Phillips, "Oaklands," Dyke Road Avenue, Hove.

Electrobak, Ltd.—H. Crawshaw, C.A., of 12, Willow Street, Accrington, was appointed receiver on September 7th, 1933, under powers contained in debenture dated March 6th, 1933.

Austin Welding Co., Ltd.—G. C. T. Page, of 1, Caerau Road, Newport, Mon, was appointed receiver and manager on August 23rd, 1933, under powers contained in debentures dated September 15th, 1930.

John Weech, Ltd.—F. W. Eacott, clerk, of 68, Fikton Road, Bristol, was appointed receiver and manager on September 1st, 1933, under powers contained in debenture dated July 4th, 1933.

Lancashire Electric Sign Construction Co., Ltd.—J. C. Blake, 7, York Road, Sale, Ches, was appointed receiver and manager on August 16th, 1933, under powers contained in debentures dated June 18th, 1931, and September 29th, 1932.

Brompton & Kensington Electricity Supply Co., Ltd.—Capital, £450,000 in 100,000 preference and 350,000 ordinary shares of £1. Return dated April 20th, 1933. 6,305 preference and 412,764 ordinary shares taken up. £199,845 paid. £219,224 considered as paid. Mortgages and charges, nil.

Tudor Accumulator Co., Ltd.—Capital, £100,000 in £10 shares. Return dated April 5th, 1933. All shares taken up. £29,000 paid (£10 per share on 2,600 and £2 10s. per share on 1,200 shares). £71,000 considered as paid (£10 per share on 6,200 and £7 10s. per share on 1,200 shares). Mortgages and charges, nil.

Nathan & Allen, Ltd.—Capital, £10,000 in £1 shares. Return dated May 31st, 1933. 3,450 shares taken up. £1,100 paid. £2,350 considered as paid. Mortgages and charges, nil.

Tisbury Electric Supply Co., Ltd.—Capital, £6,000 in £1 shares. Return dated April 20th, 1933. All shares taken up. £6,000 paid. Mortgages and charges, nil.

R. H. Spence & Co., Ltd.—(A) Debenture dated August 26th, 1933, to secure £400, charged on the company's undertaking and property, present and future, including uncalled capital. (B) Charge of same date on 9, Station Road, Egham, &c., as further security for the above amount. Holder: Mrs. M. G. H. Green, Hellings Farm, Wiveliscombe, Somerset.

Edward Wilcox & Co., Ltd.—Capital, £2,000 in 1,000 preference and 1,000 ordinary shares of £1. Return dated May 31st, 1933. 600 preference and 1,000 ordinary shares taken up. £1,163 7s. 6d. paid (£1 per share on 600 preference and 501 ordinary, and 2s. 6d. per share on 499 ordinary). Mortgages and charges, nil.

Oriental Telephone and Electric Co., Ltd.—Capital, £900,000 in £1 shares (600,000 ordinary and 300,000 preference). Return dated May 23rd, 1933. 570,199 ordinary and 188,791 preference shares taken up. £479,918 10s. paid on 291,115 ordinary and 188,791 preference (including £12 10s. paid on 50 forfeited shares). £279,084 considered as paid on 279,084 ordinary. Mortgages and charges, £122,054.

Vinces Dry Batteries, Ltd.—Land registration charge on Garford Works, 60, Garford Street, Poplar, dated August 1st, 1933, to secure all moneys due or to become due from the company to Barclays Bank, Ltd.

City Notes

Ferranti, Ltd., held their annual meeting on September 15th. Mr. V. Z. de Ferranti (chairman), who presided, in presenting the report and accounts (ELECTRICAL REVIEW, September 15th, page 371), said that having regard to the difficult times industry generally was experiencing, both at home and abroad, it was pleasing to report that the turnover of the business had been practically maintained and the profit slightly increased. During the year they had completed the transformers for the Central Electricity Board, including the two 75,000-kVA units at Liverpool, which were the largest in the grid, and they were turning their attention to the apparatus required for the distribution, measurement and use of the electricity which it made available. Radio was the electricity supply industry's best salesman, and was responsible for an ever-increasing number of consumers anxious to make use of the mains. They had widened their range of superheterodyne receivers, and had brought them within the reach of a larger number of people by reducing their costs and they had added many refinements. The excellent results obtained had been made possible by the production and use of their new heptode valve. Radiant fires had been similarly developed so that thirty-two models were available, and the present rate of sales was more than twice that of last year. New developments included an immersion water heater and an electric alarm clock.

The Sun Electrical Co., Ltd., reports a net profit for the year ended April 30th last of £14,794, as compared with £17,426 in the preceeding year, to which is added £6,665 brought in, making £21,459. As announced in our last issue (page 371), the ordinary dividend is maintained at 5 per cent., and after deducting directors' fees, lease redemption reserve, &c., a balance of £5,627 is carried forward. The directors consider that the long-continued depression shows distinct signs of passing, and that the outlook for the immediate future is better than it has been for a long time past. Business appears to be on the up grade, particularly with regard to the main electrical side of the business. The project for which additional capital was issued last year is reported to be well under way. A company has recently been formed for developing new apparatus, from which it is anticipated good profits will ultimately accrue.

Southland Power Board.—Mr. Coates, the New Zealand Finance Minister, has directed the Southland Power Board to pay the September interest to British bondholders in sterling. If the Board does not pay, the Government will do so in view of the State guarantee, and will introduce legislation later to recover from the Board the amount so paid. Mr. Coates declares that, as a result of the present situation, the Government cannot possibly agree to extend the Government guarantee, and that conversion will be attempted in 1936. The chairman of the Board has replied that it is his duty to carry out the Board's resolution, and he resents the attitude of the Finance Minister.—*Reuter* (Wellington, N.Z.).

The Bengal Telephone Corporation has given notice that it will pay off the outstanding 7 per cent. first mortgage bonds, amounting to £194,200, at 102 per cent. on January 1st, 1934.

The International Automatic Telephone Co., Ltd., has announced an interim ordinary dividend of 3 per cent., less tax (against 3¾ per cent.).

The Direct Spanish Telegraph Co., Ltd., announces that a dividend at the rate of 10 per cent. per annum, less tax, on the preference shares for the half year ended June 30th last will be paid on October 2nd.

The Hendon Electric Supply Co. has announced an interim dividend of 2½ per cent. net on the ordinary shares. Last year's interim dividend was 5 per cent., but a capital bonus of 100 per cent. was issued in April last.

British Insulated Cables, Ltd., has declared an interim dividend on the ordinary shares of 5 per cent. (unchanged).

Murex, Ltd., is paying a final ordinary dividend of 20 per cent. (same), making 30 per cent. for the year, against 35 per cent. for the preceding year.

Ward & Goldstone, Ltd., have declared the usual interim dividend for the half-year on the cumulative preference shares at the rate of 7 per cent. per annum.

The Electric Supply Corporation, Ltd., has announced an interim ordinary dividend of 4 per cent. (same). Since the last interim dividend the ordinary share capital has been increased by £50,000.

Thomas Firth and John Brown, Ltd., have intimated that trading conditions do not justify the payment of a dividend on the preference capital at present.

The American Telephone & Telegraph Co. has declared a quarterly dividend of $2.25 (same).

The Calgary Power Co. is maintaining the quarterly dividend on the common stock at 1½ per cent.

Stocks and Shares

TUESDAY EVENING.

THE British Government is now able to borrow at rates so abnormally low as to make it a practical certainty that advantage will be taken of this opportunity to float a large national loan in the near future. The prospect of the advent of such an issue serves to infuse strength into the market for similar securities, presumably because this advertises the super-abundance of money, and the difficulty which investment finds nowadays in obtaining satisfactory income. Central Electricity 5 per cent. stock of 1950-1970 has risen to 112. London and Home Counties 5 per cent. 1955-1975 is up to 114. Prior-charge stocks in the home railway market are difficult to come by, even at the advanced prices that have lately obtained. The yield on many first-rate industrial shares is little more than 4 per cent. on the money. The process of substituting a new stock, paying a lower rate of interest, for one which can be repaid at an early date, and which carries a higher rate, is in constant use. People who have been getting 5 per cent. on their money with a reasonable degree of security find, now, that they are asked to submit to a reduction to 4 per cent. or less, owing to the ease with which money can be obtained by the borrowers. Investors who hold long-dated or irredeemable stock which pays them a living return on the money are the fortunate ones at the present time. They can take, in most cases, a substantial profit upon their original outlay if they care to sell the stock, but if they do this the problem of reinvestment is one which is difficult to solve.

London Transport

London Passenger Transport "C" stock, following upon its rise of 2 points last week, has further risen to 85. This latter is about 10 points higher than the level at which the stock started in the market last July, when the London Passenger Transport issues become negotiable. The suggestion was made

here, about the same time, that the investor willing to take a moderate risk might find attractions in the stock. It might be reasonably expected, we suggested, to advance in price as time went on. Estimates of the dividend which the stock is likely to receive are still widely different, so far as the first year's distribution is concerned, the guesses ranging from 3½ to 5 per cent. The Board has adopted the sensible step of shortening its title to "London Transport." The Stock Exchange market had taken the liberty of using the abbreviation in advance; the stocks are known simply by the one name of "Transport," with the addition, of course, of the particular issue, such as A, B, or C.

British Electric Traction deferred stock at 515 is 30 points higher on the week.

Foreign Turmoils

Abroad, the financial affairs of France and of the United States are in a turmoil. The near approach of winter is held to threaten the success of the N.R.A. scheme of President Roosevelt. Disappointment is now expressed at the manner in which the plan is working. Every day adds fresh evidence of the difference of opinion that exists between the Washington administration and some of the leading banking interests in New York. Talk of inflation becomes daily louder. American Telephone & Telegraph common shares went up to 142½ before dropping back to 134½. Internationals gave way from 18½ to 16¾. If the United States steps definitely over the border line, and starts up the printing presses for the issue of money unbacked by security, then, it is held, all the utility, commodity and base metal issues will improve. Optimism is tempered, however, by the consideration that affairs are far from being normal in America just now, and that the dollar exchange, already near parity, may fall still farther in its relation to sterling and to franc.

Manufacturing and Equipment

International Automatic Telephone shares came down sharply on the reduction of the interim dividend by ¾ per cent., lowering the rate to 3 per cent. Both ordinary and deferred shares shed about 5s., the former going back to 37s. 6d., the latter to 36s. 3d. No explanation accompanied this announcement, which was unexpected. Other shares in the same group have not been affected by the fall. Ever-Ready shares are 9d. better at 29s. British Aluminium at 30s. 9d. are 6d. down. The Ferranti annual meeting produced an interesting speech from the chairman. General Electric "A" preference are better at 29s. 6d. English Electric 6 per cent. debenture advanced to 101¼. British Power and Light shares are firmer at 18s. 9d., and Whitehall Electric Investment debenture at 107 shows a gain of a point.

Cables & Wireless stocks are unchanged on the week. Great Northern Telegraphs are £1 down at 29½, in sympathy with the dullness of Continental investments generally. Cuban Telephone bonds, in spite of the so-called revolution in Cuba, have risen 5 points to 65.

Victoria Falls

The ordinary shares of the Victoria Falls & Transvaal Power Company are well maintained at 98s. 9d., and the preference hold their rise at 43s. The latter are being recommended in some quarters as a sound investment. The security is undoubtedly good, but prospective purchasers—and present shareholders—should not overlook the fact that the Union of South Africa Government has the right to acquire the company in 1950. If this option is exercised, the Government has the further right to pay off these preference shares at the par price of 20s. The contingency is one that should be kept in mind.

Shares on Offer

Edmundson's ordinary have been substantially bought during the past week or two. The price has strengthened to 36s. 6d., at which there are 2,500 on offer, yielding, at that figure, £3 16s. 9d. per cent. on the money—taking, that is to say, 7 per cent. dividend as the basis of calculation. This rate has been paid for the past four years. A line of 5,000 Associated Electrical Industries ordinary is offered at 21s. 3d. The dividend for 1932 was 4 per cent. Of General Electric ordinary, there are 1,000 on offer at 45s. 3d. to give 3½ per cent. on the money. Amongst electricity supply shares 500 Notting Hill Electric Light ordinary are available at 40s. 6d. These return £3 19s. 6d. per cent. on the basis of the last-paid dividend. Study of any list of electricity shares which are obtainable in the market will demonstrate the faith that people have in the industry, because in few cases does the return exceed more than 4½ per cent. on the money. In the majority of instances, the investor must be prepared to take less.

Miscellaneous Matters

Babcock & Wilcox are flat at 33s. 6d. on fears lest there may be a cut in the dividend. Vickers keep up close to 7s. 9d. Rubber shares have hardened a trifle, it being expected that Dutch interests will make a definite movement towards restriction of output. Business in Stock Exchange markets has fallen off to a great extent, as compared with a month ago, the uncertainties which surround the foreign exchange position being responsible for hesitation on the part of investor and speculator alike.

Share List of Electrical Companies

	Nom.	Approx. Dividend. 1931.	1932.	Price, Sept. 19.	Rise or Fall.	Yield. p.c. £ s. d.
HOME ELECTRICITY COMPANIES.						
Bournemouth and Poole	1	15	15	77/6	—	3 17 5
Brompton Ordinary	1	8½	7	33/-	—	4 4 10
Charing Cross Ordinary	1	8½	7	33/-	—	4 4 10
Chelsea	1	8¾	7	32/6	—	4 6 2
City of London	1	10	10	33/9	—	4 3 0
Clyde Valley	1	7	7	38/3	+9d.	3 13 8
County of London	1	10½	10½	55/0	—	3 15 1
Edmundson's 7% Pref.	1	7	7	33/-	—	4 4 10
Elec. Dis. Yorkshire	1	9	9	48/9	—	3 13 9
Elec. Supply Corporation	1	11	11	77/6	—	2 16 8
Kensington Ordinary	1	8	7	33/6	+1/-	4 3 7
Lancs Light and Power	1	7	7	35/9	—	3 18 5
London Electric	1	9	7	33/-	—	4 4 10
Metropolitan	1	10	10	51/3	—	3 18 2
Midland Counties	1	7	7	36/3	—	3 17 5
Mid. Elec. Power	1	8	8	40/-	—	4 0 0
North Eastern Electric Ordinary	1	6	6	32/6	—	3 13 10
Do. 7% Pref.	1	7	7	33/-	—	4 4 10
Northampton	1	10	10	53/3	—	3 15 0
Notting Hill 6% Pref.	10	6	6	13½	—	4 12 4
North Met. Elec. 6% Pref.	1	6	6	29/6	—	4 1 4
St. James' and Pall Mall	1	8	7	33/-	—	4 4 10
Scottish Power	1	8	8	40/-	—	4 0 0
South London	1	8½	7	33/-	—	4 4 10
Westminster Ordinary	1	8½	7	33/6	+6d.	4 3 7
Whitehall Elec. Invst. 7½% Pref.	1	7½	7½	21/3	—	7 1 2
Yorkshire Elec.	1	8	8	46/3	—	3 9 3
PUBLIC BOARDS.						
Central Electricity, 1950–70	Stock	5	5	112	+1	4 9 1
Do. 1951–73	"	4½	4½	109	—	4 2 7
Do. 1963–93	"	—	3½	92½	+½	3 15 8
London & Home Counties, 1955–75	"	4½	4½	107	—	4 4 1
London Passenger Transport, A	"	—	4½	116	—	3 17 7
Do. do. B	"	—	5	119	—½	4 4 0
Do. do. C	"	—	—	85	+2	—
TELEGRAPH AND TELEPHONES.						
American Tel. & Tel.	$100	9	9	134½xd	—5	6 13 10
Anglo-Am. Tel. Pref.	Stock	6	6	112	+½	5 7 7
Do. Def.	"	1½	1½	28	—	5 5 3
Cables & Wireless 5½% Pref.	"	2½	2½	81½	—1	3 7 6
Do. A 7½% Ord.	"	Nil	Nil	29	—	—
Do. B Ord.	"	Nil	Nil	14	—	—
Globe Tel. and T. Ord.	10	Nil	2½	11½	—	2 3 6
Do. do. Pref.	10	6	6	12½	—	4 17 0
Great Northern Tel.	10	20	20	29½	—1	6 15 7
Marconi-Marine	1	10	7½	32/6	—	4 12 4
Oriental Telephone Ord.	1	12	12	27	—	*4 3 6
HOME AND FOREIGN TRAMS, ETC.						
Anglo-Arg. Trams First Pref.	5	Nil	Nil	4/6	—	—
Do. do. 2nd Pref.	5	Nil	Nil	3/3	—	—
Do. do. 5% Deb.	Stock	Nil	Nil	10½	—	—
British Electric Traction Df. Ord.	"	5	5	515	+30	—
Do. do. Pref. Ord.	"	8	8	142½	—	5 12 3
Brazil Traction	100	—	—	14½	—¼	—
Brit. Columbia Elec. Rly. Pcc.	Stock	5	5	102	—	4 18 0
Mexico Trams, 5% Bonds	—	5	5	27½	—	18 3 8
Mexican Light Common	100	Nil	Nil	11½	—	—
Do. 7% Pref.	100	7	7	15	—	—
Do. 1st Bonds	—	5	5	50	—	10 0 0
Victoria Falls Ord.	1	15	20	98/9	—	4 1 6
Yorkshire (West Riding)	1	Nil	Nil	14/6	—1/-	—
MANUFACTURING COMPANIES.						
Assoc. Elec. Ord.	1	4	4	21/3	—	3 15 3
Do. Pref.	1	8	8	30/9	—	5 4 2
Babcock & Wilcox	1	14	9	33/3	—3/6	5 8 3
British Aluminium Ord.	1	5	5	30/9	—6d.	3 5 0
British Insulated Ord.	1	15	15	71/3	—	4 2 4
Brush Ord.	Stock	Nil	Nil	37	—	—
Callender's	1	15	15	3¼	—	4 16 0
Do. 6½% Pref.	1	6½	6½	28/9	—	4 10 5
Crompton Parkinson Ord.	5/-	22½	—	18/3	—	6 5 7
Do. 8% Pref.	1	8	8	28/9	—	5 11 4
Edison-Swan 1st Pref.	1	7½	7½	24/6	—	6 2 5
Do. 5% Deb.	Stock	5	5	102½	—	4 17 7
Electric Construction	1	Nil	Nil	8/9	—	—
Enfield Cable Ord.	1	25	25	91/3	—	5 9 8
English Electric	1	Nil	Nil	10/-	—	—
Do. do. Pref.	1	Nil	Nil	15/-	—	—
Ever Ready	5/-	35	35	29/-	+9d.	6 0 8
Ferranti Pref.	1	7	7	25/9	—	5 8 9
G.E.C. Pref.	1	6½	6½	29/6	+6d.	4 8 2
Do. Ord.	1	8	8	45/-	—	3 11 2
Henley's	1	30	30	6¾	—	4 14 4
Do. 4½% Pref.	5	4½	4½	5½	—	4 5 9
India-Rubber	1	Nil	Nil	3/9	—	—
Johnson & Phillips	1	5	5	22/-	—	4 11 0
Siemens Ord.	1	7½	6½	24/6	—	5 6 0
Telegraph Construction	£1	Nil	Nil	23/9	—	—

* Dividends paid free of Income Tax.

Published Specifications

Compiled expressly for this journal by a firm of chartered patent agents. The numbers in parentheses are those under which the specifications will be printed and abridged, and all subsequent proceedings will be taken.

1931

34528. "X-ray tube mountings." O. H. Pieper. December 15th. 1930. (397483.)

1932

2624. "Electric supply systems." A. H. Midgley and Midgley Leighton, Ltd. January 28th, 1932. (397531.)

4973. "Electrical transformers particularly for use as intervalve transformers in radio apparatus." Pye Radio, Ltd., J. W. Dalgleish, and E. V. Root. February 19th, 1932. (397536.)

5160. "Preparation of aluminium or aluminium alloy anodes for electrolytic condensers and rectifiers." British Aluminium Co., Ltd., A. G. C. Gwyer, and A. N. D. Pullen. February 20th, 1932. (397538.)

5232. "Electrical primary cells." C. H. Vince, Junr. February 22nd, 1932. (397475.)

5246. "Diathermy electrodes." C. B. Henry. February 22nd, 1932. (397477.)

5288. "Dehydration of electrolysable salts of easily oxidisable metals." Johnson Matthey & Co., Ltd. February 20th, 1931. (397479.)

5386. "Electric cable systems." Siemens Bros. & Co., Ltd., and H. G. Wood. February 23rd, 1932. (397539.)

5443. "Electric motor control systems." General Electric Co., Ltd., H. J. Coates, and C. W. Saunders. February 23rd, 1932. (397499.)

5613. "Magnetic control of electric arc lamps." J. O. Armstrong. February 25th, 1932. (397517.)

5691. "Wireless direction-finding, bearing-finding, and similar systems." Marconi's Wireless Telegraph Co., Ltd., S. B. Smith and T. L. Eckersley. February 25th, 1932. (397524.)

5740. "Variable resistances for use in electrical measuring apparatus." A. Love. February 26th, 1932. (397541.)

5830. "Electrical impedance networks and amplifiers." Telefonaktiebolaget L. M. Ericsson. March 12th, 1931. ((397551.)

5844. "Telephone systems." Automatic Electric Co., Ltd. February 26th, 1931. (397552.)

5940. "Short-wave oscillation generators." Marconi's Wireless Telegraph Co., Ltd., and E. W. B. Gill. February 27th, 1932. (397555.)

6265. "Electrical signalling apparatus for rope haulage railways." P. C. J. Spray and A. E. Davies. March 2nd, 1932. (397560.)

6353. "Apparatus for measuring electrical resistance." General Electric Co., Ltd., H. C. Turner, and A. Sherwin. March 2nd, 1932. (397563.)

6665. "Electroplating and other vats, tanks and like vessels." P. E. Randall. March 5th, 1932. (397565.)

7299. "Electrical measuring instruments." Dr. C. V. Drysdale. March 11th, 1932. (397569.)

7527. "Electrical wave filters." General Electric Co., Ltd., and D. A. Ley. March 14th, 1932. (397571.)

9032. "Electric reading lamps." S. S. Galsworth. March 29th. 1932. (397585.)

9503. "Electric conducting line suspension clamps." M. Taylor. April 2nd, 1932. (397589.)

10206. "Electric tumbler switches such as used in connection with electric fires and the like." J. A. Crabtree. April 9th. 1932. (397593.)

12471. "Instruments for use in tests for detecting faults in masses of magnetic material." A. J. King, A. M. Armour and Associated Electrical Industries, Ltd. April 30th, 1932. (397607.)

12570. "Apparatus for effecting the electrodeposition of metals." G. E. Adey. May 2nd, 1932. (397609.)

12727. "Electrically illuminated advertising or like signs." G. C. Hagger. May 3rd, 1932. (397611.)

12989. "Two-stage thermionic valve." Radioakt.-Ges. D. S. Loewe and Dr. P. Kapteyn. May 6th, 1931. (397612.)

13790. "Loud speakers." E. R. Dempster and Magnavox (Great Britain), Ltd. May 13th, 1932. (397617.)

14006. "Electric snap switches." Igranic Electric Co., Ltd. May 16th, 1931. (397619.)

14044. "Transmission and receiving arrangements for ultra-short waves." J. Pintsch Akt.-Ges., Dr. K. Kohl, and Sud-deutsche Telefonapparate-Kabel und Draht-Werke Akt.-Ges. Tekade. May 16th, 1931. (397620.)

16713. "Electric transformers." A. C. Schwager. July 6th, 1931. (397635.)

18927. "Method and apparatus for transmitting and receiving television images." H. J. Cooper. July 5th, 1932. (397648.)

20729. "Manufacture of thermionic cathodes for electric discharge devices." General Electric Co., Ltd., and J. T. Randall. July 22nd, 1932. (397656.)

22441. "Automatic by-pass for hydro-electric steering apparatus." Etablissements P. Duclos. April 15th, 1932. (397668.)

23199. "Electrical fuses of the multiple-element type." E. C. Cacilli. August 27th, 1931. (397671.)

23751. "Shock absorber for protecting hanging filament lamps from vibration." E. Smith. August 25th, 1932. (397673.)

24124. "Conversion of continuous current into three-phase current." Akt.-Ges. Brown Boveri et Cie. August 29th, 1931. (397674.)

25323. "Securing device for permanent magnets." Landis and Gyr Akt.-Ges. September 24th, 1931. (397677.)

25917. "High-pressure metal-vapour arc lamps." Siemens and Halske Akt.-Ges. September 17th, 1931. (397680.)

25970. "Arrangement for transmitting topical occurrences to a television sender." M. Von Ardenne and Dr. S. Loewe. September 25th, 1931. (397681.)

26001. "Moving-coil loud speakers." General Electric Co., Ltd., and D. A. Oliver. September 19th, 1932. (397682.)

27039. "Heat distributing bodies (top plates) for electric cooking plates." Aktieselskapet Elektrisk Bureau. October 1st, 1931. (397684.)

27303. "Electromagnetic pumps with vibratory movement for gaseous fluids." G. Nagman, R. Stratta and E. Vernazza. September 30th, 1932. (397686.)

27413. "Switch adapters, particularly for lamps having two filaments." J. T. F. Conti. October 3rd, 1932. (Convention date not granted.) (397687.)

27599. "Television method." M. Von Ardenne. October 6th, 1931. (397688.)

30660. "Electrically controlled toy vehicle." M. A. Damprine. November 16th, 1931. (397708.)

31021. "Method of and means for mounting electric immersion heaters in containers." L. P. Haussauer. November 3rd, 1932. (397709.)

31692. "Electric discharge apparatus." Siemens Schuckertwerke Akt.-Ges. November 9th, 1931. (397712.)

31941. "Installations comprising a gas-filled electric discharge lamp." Naamlooze Vennootschap Philips Gloeilampenfabrieken. November 12th, 1931. (397716.)

32376. "Electric lamps." L. Rivier. November 16th, 1931. (397719.)

32398. "Combined vehicle headlamps and audible warning devices." M. A. Hassid. November 16th, 1932. (397720.)

32789. "Sound amplifying diaphragms or horns for wireless sets, talking machines, musical instruments, or other sound producing devices." A. G. Mathews and A. G. Wright. November 19th, 1932. (397721.)

33132. "Telegraph apparatus." A. F. Hulsewe. November 23rd, 1932. (397725.)

34714. "Electric motor control systems." International General Electric Co., Inc. December 8th, 1931. (397733.)

36705. "Grid controlled rectifiers." Akt.-Ges. Brown Boveri et Cie. December 28th, 1931. (397745.)

1933

513. "Lids or covers for electric accumulator jars." Britannia Batteries, Ltd. January 6th, 1932. (397750.)

1950. "Contact-making device for electric pocket lamps." K. Braun and Hoka Elektrotechnische Fabrik Ges. January 20th, 1933. (397758.)

1968. "Elevator installations." Waygood-Otis, Ltd. February 29th, 1932. (397557.)

2063. "Valve amplifying circuits." Television Laboratories, Ltd., and P. T. Farnsworth. January 21st, 1933. (397759.)

2186. "Electric motor control systems." British Thomson-Houston Co., Ltd. January 23rd, 1932. (397761.)

2890. "Radio signal receiving systems." British Thomson-Houston Co., Ltd. January 30th, 1932. (397762.)

2914. "Volume-control systems suitable for use in radio-receiving and like apparatus." Marconi's Wireless Telegraph Co., Ltd. January 30th, 1932. Cognate application 2915/33.) (397763.)

3706. "Speed control of induction motors by means of mercury-vapour frequency changers." English Electric Co., Ltd., J. E. Calverley, and R. D. Ball. February 7th, 1933. (397768.)

4815. "Luminous electric discharge tubes." General Electric Co., Ltd. March 7th, 1932. (397774.)

7339. "Braun tubes." H. E. Holmann. May 30th, 1932. (397785.)

8265. "Method of and means for securing clips to troughing for supporting electric cables." Harland & Wolff, Ltd., and F. Johnston. March 18th, 1933. (397790.)

8832. "Electrically driven machines for production mesh fabric and particularly knitting machines." Sinfra Akt.-Ges. St. Gallen. March 24th, 1932. (397793.)

9352. "Electrical switchgear." G. E. Whitehead and Whiteheads Electrical Inventions, Ltd. June 21st, 1932. (Divided application on 17535/32.) (397796.)

11341. "High tension electrical switch installations." Siemens-Schuckertwerke Akt.-Ges. April 18th, 1932. (397803.)

12453. "Electro-hydraulic operating mechanism." British Thomson-Houston Co., Ltd. April 29th, 1932. (397807.)

Trade Mark Applications

The following are among the recent applications for British trade marks. Objections against any of the proposed marks may be lodged within one month from the dates mentioned.

September 6th.

Eumig (lettering and design). No. 542587. All goods in Class 8. The firm trading as the Eumig Elektrizitäts und Metalwaren Industrie, Vienna, VI, Austria. (British representatives, Johnsons, 41, St. Vincent Place, Glasgow.)

September 13th.

Lodex. No. 541930. Class 8. Instruments and apparatus and parts thereof for use in wireless telephony and telegraphy, television and sound reproducing and recording, and wireless telephonic and telegraphic apparatus in combination with gramophones.—McMichael, Ltd., Danes Inn House, 265, Strand, W.C.2.

Metaplex. No. 542287. Class 8. Component parts of radio receiving sets, and treated with a metallic preparation to impart a screening property.—Peto-Scott Co,, Ltd., 77, City Road, E.C.1.

Deverr. No. 540795. Class 50. Artificial resin sold in the form of rods, bars and sheets and as moulding powders for industrial purposes.—Vereinigte Chemische Fabriken Kreidl, Heller and Co., Vienna, XXI, Austria. (British representatives, Marks and Clerk, 57-58, Lincoln's Inn Fields, W.C.2.)

Sampling of Large and Run-of-Mine Coal

The British Standards Institution's new method for the sampling of large and run-of-mine coal follows in general principles the same theory that was adopted as a basis for the sampling of small coal; it lays down the size of gross sample to be taken and the methods of collection and reduction to be used for coal from chutes, conveyors and wagons, both riffle and the hand methods of reduction being described. The Committee is unable to recommend a standard method for sampling from heaps that would be generally applicable. Copies of this Specification (B.S.S. No. 502-1933) can be obtained from the Institution, 28, Victoria Street, S.W.1, price 2s. 2d. post free.

New Work for Contractors

Particulars of new works and building schemes for the use of electrical installation contractors and traders

Publication in this list is no guarantee that electrical work is definitely included. Alleged inaccuracies should be reported to the Editors.

Airdrie.—Houses (£100,000); burgh surveyor.

Alton (HANTS).—Council chamber and fire station; Cancellor & Sawyer, architects, Queen Anne Chambers, Winchester.

Ambleside.—Catholic church and presbytery (£4,000); Hugh Rainey, builder, Barrow-in-Furness.

Ashton-under-Lyne.—Elementary school for E.C.

Ayr.—Houses (36); burgh surveyor.

Banstead.—Houses (52), Woodmansterne Manor Estate; F. H. Ayling, Ltd.

Bexley Heath.—Cinema, with electrical work; Sidney Bacon's Pictures, Ltd., 103, Great Russell Street, London, W.C.

Birkenhead.—Houses (276) and flats; R. W. Johnston, borough engineer.

Birmingham.—Shops, Stratford Road, Shirley, with electrical work; S. G. Marsh, builders, Hobmoor Road, South Yardley.

Bishop Stortford.—Houses (26), Tuckers Row area; U.D.C. surveyor.

Blackpool.—Houses (26), Horncliffe Road; A. & G. R. Fletcher. Factory, Plymouth Road; Associated Textile Industries (Macclesfield), Ltd.

Boston.—Factories, The Dock, for Doughty Richardson Fertilisers, Ltd., and Goole Tillage Co., Ltd.

Bridgwater.—Houses (81); Standerwick & Co., builders.

Bridlington.—School, Priory site, for Borough E.C.; director of education.

Bromley (KENT).—Houses (70), Widmore Lodge Estate; H. F. Thoburn, Ltd. Shops (22), Southborough; T. Spencer Bright, surveyor, 2 .New Court, London, W.C. Houses (53); W. J. Scudamore, builder, 1, Burnt Ash Hill, London, S.E. Houses (48); Chalet Estates, Ltd.

Bucklow (CHESHIRE).—Reconstruction, Dunham Massey sewage disposal works, with pumping station, &c.; H. V. Shaw, engineer, 24-26, Station Buildings, Altrincham.

Burton-on-Trent.—Houses (35); borough surveyor.

Cambridge.—Houses (100), Coldman's Lane; Hundred Houses Society, Ltd.

Cannock.—Houses (52), Pye Green (£15,444); Direct Labour Department, builders, of Council.

Carlisle.—Catholic church, Currock; J. R. Bell, Ltd., builders.

Carshalton.—Houses (76), Avenue Road area; U.D.C. surveyor. Shops, Wrythe Lane and Rose Hill; A. J. Butcher.

Chard.—Houses (24); William Potter & Sons, builders, Taunton.

Chester-le-Street.—Houses (75); M. Wilson, R.D.C. architect, Union Offices.

Chippenham.—Houses (36), Marshfield Road; W. Rudman, architect, 32, Market Place.

Clacton-on-Sea.—Laundry extensions, Coppins Road, for the Brentwood and East Essex Laundry Co., Ltd. Bazaar premises, Pier Avenue, for Marks & Spencer, Ltd., London.

Colchester.—Houses (120); borough surveyor.

Cowdenbeath (FIFE).—Houses (80); burgh surveyor.

Dalton (ROTHERHAM).—Houses (50) for J. Lister, Listerdale.

Dover.—Houses (355); borough engineer.

Droitwich.—Houses (30), The Vines (£8,115); J. & A. Brazier & Son, builders, Worcester Road, Bromsgrove.

Fifeshire.—Mining school, Cowdenbeath (£22,000); G. Sandilands, county architect, Kirkcaldy.

Folkestone.—Houses (127); borough surveyor.

Forehoe (NORFOLK).—Houses (31); R.D.C. surveyor.

Glasgow.—Cinema, Renfield Street, for the Paramount Theatres, Ltd.

Greasborough (YORKS).—Houses (50); J. Totty, U.D.C. architect, Moorgate Street, Rotherham.

Halesowen.—Houses (137), Quinton Hill Estate, for Stanley J. Smith & Co.

Harrogate.—Houses (32), Ripon Road; borough surveyor.

Henley-on-Thames. — Houses (67), Workhouse Meadow; borough surveyor.

High Wycombe.—Houses (260); R.D.C. surveyor.

Hounslow.—Houses (34), Wellington Road; P. Chase, Gardner & Co., Ltd.

Ince-in-Makerfield.—Houses (54), Higher Ince; W. Thornley, U.D.C. architect, 46, Wallgate, Wigan.

Inverness.—Swimming bath (£15,000); A. F. Mackenzie, burgh surveyor.

Irish Free State.—(GALWAY).—Cinema, with electrical work, Eglinton Street, for Walter McNally (£18,000).

Irlam.—Municipal offices for Special U.D.C. Committee. Extensions, St. Teresa's Catholic schools, Astley Road; trustees.

Isle of Ely.—County library headquarters, March; R. D. Robson, county architect, March.

Kidderminster.—Houses (50), Broadwater Street; I. Hawcroft, borough surveyor, 110, Mill Street.

Kirkcaldy.—Reconstruction of Employment Exchange; manager, Employment Bureau.

Lanarkshire.—Primary school, Forth, for County E.C.; J. Stewart, county architect, 20, Albert Street, Motherwell.

Largs (AYRSHIRE).—Administrative block for the Eastpark Home (£3,450); the superintendent.

Liverpool.—Cinema, Pudsey Street, for the Paramount Theatres, Ltd. (£300,000), with electrical work; A. E. Shennan, architect, 14, North John Street.

London.—(CAMBERWELL).—Extensions, Town Hall (£49,435); Galbraith Bros., Ltd., contractors. (LEE).—Shops, High Road and Lewis Grove; P. W. Davies. (LEWISHAM).—Houses (58), Hall Park Estate; A. J. Glock, Ltd. Public library and baths, Downham; borough surveyor. (RAYNES PARK).—Station (£18,000), for the Southern Railway Co.

Louth.—Houses (50); borough surveyor.

Macclesfield.—Houses (28), Poynton; R.D.C. surveyor.—Three storey building to mill premises, Guncoe Lane; Backhouse & Coppock, Ltd. Sutton Mills; J. Clayton, Ltd., builders, Sunderland Street.

Melbourn (HERTS).—Houses (97); R.D.C. surveyor.

Motherwell.—Garage, Stewarton Street, for the Scottish Motor Traction Co., Ltd., 29, East Fountain Bridge, Edinburgh (£7,000) with electrical work.

Newcastle-on-Tyne.—Houses (116), Druridge Avenue; Kirk and Dickinson, builders, Regent Terrace, New Bridge Street. Additions to Howard Stores, Ltd., Clayton Street; W. Stockdale, architect, 73, Howard Street, North Shields.

New Malden.—Public hall and baths, King's Avenue (£23,500), with electrical work; U.D.C. surveyor.

Newport (I.o.W.).—Showrooms and store, Medina Avenue; E. L. Smith, architect.

Northern Ireland.—(BELFAST).—Extensions, Peters Hill Baths (£45,000) with electrical work; T. W. Henry, architect, 51, Scottish Temperance Buildings.

Oldbury.—Houses (28), Churchbridge site, and Blakeley Hall Estate; U.D.C. surveyor. Welfare Centre, Warley (£4,447), with electrical work; W. Greenwood, surveyor.

Oxford.—Houses (132); Universal Housing Co., builders.

Penrith.—Alterations to the Alhambra Theatre; Chadwick Bros., builders, Blackpool.

Pontefract.—Houses (40); Frank Haslam, Ltd., builders, Doncaster. Houses (156); borough surveyor. Factory extensions, Session House Yard, for Dunhills (Pontefract), Ltd.

Portsmouth.—Houses (1,429); Borough engineer. Houses (49), Hawthorn Crescent; G. & W. Mitchell. New stage for the pier pavilion (£3,900); G. Coles, architect. Shops, 34-6, High Street, Cosham; Timothy White, Ltd. Shops and flats, Meredith Road; G. W. Day. Elementary school, Cosham for E.C. Alterations to New Prince's Cinema, Lake Road; manager. Extensions, Arundel Street School (£2,130); E. & A. Springings. Extensions, Portsdown School (£9,888); W. J. Nightingale & Son. Extensions, Solent Road School (£2,897); L. Hoad. Extensions, Town school (£3,150); Tanner Bros.

Radlett.—Bank premises, with electrical installations, junction of Watling Street and Station Road for Barclays Bank, Ltd., Poultry, Cheapside, London, E.C.4.

Rawtenstall.—Extensions, Osborne Mill, Burnley Road; Lambeth Howarth & Sons, Ltd.

Redhill.—Methodist central hall, with cinema electrical and heating work (£35,000); Rice & Son, builders, London.

Richmond (SURREY).—Flats (48), Queensberry House Estate, Friars Lane; A. M. Lock, architect, 80, Baron's Court Road, West Kensington, W.14.

Ruislip.—Houses (324), Manor Homes Estate; George Ball (Ruislip), Ltd.

Ryde.—Reconstruction of Town Hall; borough surveyor.

Sandbach (CHESHIRE).—Houses (20); U.D.C. surveyor.

Scarborough.—Houses (26), Newlands Park Avenue; Wilkinson and Smith.

Seaham.—Slum clearance scheme; J. B. Abbey, U.D.C. surveyor, Council offices.

Sleaford.—Houses (72), North Road; U.D.C. surveyor.

Stamford.—School (£11,613); R. S. Jellings, Ltd., Peterborough.

Stanley (DURHAM).—Houses (20); U.D.C. surveyor.

Stoke-on-Trent.—Cinema, Central site, Tunstall (£30,000), for Alderman R. Beresford.

Sunderland.—Houses, Grange Estate; W. and T. R. Milburn, architects, 17, Fawcett Street.

Swindon.—Houses (40), Gipsy Lane; Bishop & Fisher. School (£45,017), for Borough E.C.; Spackman & Sons, builders.

Thingoe (SUFFOLK).—Houses (21); R.D.C. surveyor, Bury St. Edmund's.

Tipton.—Houses (228), Ocker Hill; A. W. Griffiths & Co., builders, Wolverhampton.

Tunstall (STAFFS.).—Cinema (£25,000); Alderman R. Beresford, deputy-Mayor of Newcastle-under-Lyme.

Tynemouth.—Rebuilding of the "Cinema Royal"; W. Stockdale, architect, 73, Howard Street, North Shields.

Uttoxeter.—Houses (125); A. M. Griffiths & Sons, Ltd., builders, Wolverhampton.

Wadebridge (CORNWALL).—Houses (24); U.D.C. surveyor.

Walsall.—Arcade and shops, Park Street (£9,950); borough engineer.

Wantage.—Houses (42), Trinder Road; U.D.C. surveyor.

Warrington.—Houses (300); Clough & Gaskell, Ltd., builders, Pemberton, Wigan.

West Bromwich.—Shops, Jervoise Lane, Charlemont Estate; Arnold & Hewitt, architects, High Street.

West Riding.—Senior School, Bolton-on-Dearne; Education Officer, County Hall, Wakefield.

Whitehaven.—Houses (60), Salterbeck; borough surveyor.

Willenhall (STAFFS.).—Factory for Josiah Parks & Son, Union Works, with electrical work; A. & T. Bertram Butler, architects, Darlington Street, Wolverhampton.

Wolverhampton.—R.C. Church, Oldfallings (£6,500), with electrical work; Deacon & Boardman, builders, Algernon Street, Walsall.

Wortley (YORKS).—Houses (88); R.D.C. surveyor.